

Railway infrastructure management

Teacher's Guide

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The aim of this Teacher's Guide is to provide a guide to teachers using the related e-resources for vocational education classes. The first section of the guide contains introductory notes on methodology and the role of different

aspects of language within the course, plus some comments as to the teacher's different roles during the lesson and the implications of these. Later sections deal with individual lessons and include full scripts of all listening and reading texts, keys for each task and suggestions for further work with the learners.

Introductory notes

Course goals

The material provided has specific and limited goals. The main focus is on lexis related to specific technical areas and fields of professional competence. The lexis is presented in a range of communicative contexts. These are mainly transactional dialogues which provide listening practice of real-world language use, but also include reading texts from technical manuals and the like. These texts - both aural and written - contain many highly valuable examples of functional language. For anyone undertaking a career in such fields as: electrics, electronics and energy engineering familiarity with a range of technical lexis is necessary but not by itself sufficient: as well as understanding the technical terms an employee must interact and cooperate with other employees, managers and clients. Therefore the notes provided for each lesson include ideas on how to exploit the texts and examples for communicative as well as linguistic purposes.

Dealing with receptive skills

Pre-text work: activating schemata

Outside the classroom it is very rare for us to listen to or read a text without any kind of preparation. Generally, we know quite a lot about what we are going to hear or read: we know where it comes from, why it was written, what style to expect and, for example, how much information will be included. We also have a purpose for our listening or reading. We might be looking for some particular information or checking if something we believe is actually correct. All of this helps us to read efficiently. Therefore it is important to set texts up in a similar way in class, using visual or other stimuli and allowing students time to build expectations and reflect on what answers they expect. The better we can generate interest in the topic and encourage students to form expectations

with regard to the text, the more effective our receptive skills work is likely to be.

Work on the text: task-types and sequencing

Tasks move from the very global to the more detailed. Initial comprehension tasks do not require the students to understand everything in the text, but rather serve to introduce the students to it. They do, however, still represent real-world practice, as the tasks reflect the way that we process texts outside the classroom: for example reading them in order to get a general impression, or searching for a particular piece of information.

Post-text work: follow-ups and extensions

This can be linguistic (grammar or vocabulary) or skills (especially productive skills - speaking or writing) practice. Naturally, not all texts offer potential for honing fluency but those that do can be usefully exploited through drama activities (acting out dialogues with a partner, for example).

The role of lexis

Lexis forms the main focus of the material. Each lesson introduces a range of technical terms, from individual vocabulary items to fixed phrases of varying length and complexity. It is important to consider how these items will be used by learners. Some items are to be taught only for passive use, which is to say the learners will need only to recognise and understand them when encountered in technical instruction manuals or parts catalogues, or when given instructions referencing them. Other items may be worth teaching for active use - i.e. the learners will need not only to recognise and understand them, but also to use them in communicative interactions and, therefore, to some degree modify them. The instructor's awareness in this respect will determine how the lexical items will be taught and how much detail the learners should include in their notes.

Items of vocabulary and lexical phrases do not exist in isolation. Where there are common collocational patterns these should be highlighted to the learners, especially in the case of items intended for active use. In the learner's material these patterns are not explicitly identified but they are listed in this guide. Very often this will not require the learning of any additional language items by the learner, as many collocating verbs and adjective are very simple ('do', 'make', 'have', 'big', 'major' etc). Highlighting the existence of these patterns, including

them in the practice activities in the lessons and encouraging learners to record them in their notes are very valuable habits and this guide will include reminders and suggestions as to when and how to incorporate such strategies.

When teaching lexis it is also important to distinguish between specific and general terms. Learners need to be aware of how widely a given term is used. A term may have a limited technical meaning and be used only in a narrow range of contexts, such as in conversations between specialists, or it may be a term which can be used in communication with non-specialists in more everyday situations. Some terms, of course, may have multiple meanings so that they have one meaning in a technical conversation and another meaning outside of this. An example would be the term 'aggregate' which to a specialist may have one meaning (a tractor connected to another piece of agricultural equipment) but which to a layman may mean something entirely different (the total score of a player or team in a fixture comprising more than one game or round). Ensuring that learners are aware of these differences in usage is important to avoid potential problems outside the classroom later on.

One way to highlight collocations in a student-centred and engaging way, while still maintaining a clear focus on the relevant items, is to write up part of the collocation on the board and ask the students to find the collocating parts. For example, if the phrase is: 'it was pouring with rain' then the teacher might write up 'rain' on the board and ask the students to find the phrase with 'rain' in the text. Once they have done this it can be decided if the phrase is a fixed expression or allows for some modification.

Teaching functional language

Functional language by its nature derives much of its meaning from the context in which it is used and therefore it is crucial to exploit the context when introducing such language, and to ensure that the intentions of the speakers are clearly identified. While some functional expressions can usefully be analysed in terms of generative grammatical structures, most are best considered fixed or semi-fixed expressions and dealt with and recorded accordingly. This guide lists the most useful functional exponents occurring in each lesson, allowing the teacher to select according to the particular needs of the particular group.

When dealing with functional language the bare meaning is important but not always sufficient. Appropriacy is also an important aspect. The teacher must

remember to establish whether a particular exponent is formal, informal or neutral, and in what contexts it may be used. As with collocations, the students should be able to recognise which parts of the item are fixed or semi-fixed and which can be restructured or modified. For example:

‘How do you do?’ is a fixed expression which is rarely modified.

‘How are you doing?’ is an expression which can be modified to a degree. For example, we can say ‘How are we/they doing?’, ‘How is he/she doing?’, ‘How are you coping?’ and ‘How are you managing?’ and so on.

Dealing with pronunciation

Broadly speaking, we can identify three aspects of pronunciation teaching:

- during language introduction and clarification
- prior to speaking tasks to facilitate production
- during feedback for remedial or corrective purposes

These will, obviously, affect the way you go about pronunciation work. During language introduction the teacher may highlight aspects of the target language which they expect to be challenging and it is crucial to provide a model of the whole item or structure, with an emphasis on accuracy.

Fluency is much more the focus when dealing with pronunciation before speaking tasks. For this reason it is important to model and drill the language in context - putting the phrase in a short sentence, for example, rather than dealing with it in isolation. With remedial pronunciation work the aim is to raise awareness of the error and demonstrate the correct form so it is helpful to isolate and highlight the specific problem, exaggerating it for clarity’s sake.

Drilling is quite a mechanical activity, having its roots in behaviourist habit formation. To avoid losing the students’ focus it is important to keep the energy level and the pace high, and having a clear drilling routine at your fingertips, so to speak, is the simplest way to achieve this. Here is one such pattern:

1. THE TEACHER MODELS THE TARGET LANGUAGE THREE TIMES
2. THE STUDENTS REPEAT CHORALLY
3. THE STUDENTS REPEAT CHORALLY AGAIN
4. THE TEACHER HIGHLIGHTS KEY ASPECTS OF THE TARGET LANGUAGE

5. THE STUDENTS REPEAT CHORALLY

6. THE TEACHER NOMINATES INDIVIDUAL STUDENTS TO REPEAT INDIVIDUALLY WITH CORRECTION AS APPROPRIATE

7. THE STUDENTS REPEAT CHORALLY TO FINISH

The entire drill should be conducted at pace without allowing the energy levels to fall, which means that we move from stage to stage without hesitation. Effectively it can become something akin to a rap with the only pauses when correction is required. The students may repeat the target language five or six times in total in the space of less than two minutes, giving them intense practice without boredom and loss of motivation. Within the drill the teacher may use various techniques - highlighting with gestures, showing contractions with fingers, asking students to identify particular words in the phrase and so on - and after the drill the teacher may choose to follow up with some repetition in pairs to allow monitoring. It is important to remember that no drill can guarantee perfect pronunciation; it is a process which takes time and which tends towards gradual incremental improvement rather than leaps forward.

The role of grammar

Grammatical structures are not the main focus of the material. That is not to say that they have no place, but rather that they should be introduced where a focus on the structure is likely to be of communicative value to the learner. Though, as said above, functional exponents are generally most usefully taught as expressions, it can sometimes be beneficial to highlight generative grammar patterns and this guide highlights where this is the case.

Recycling and revision

The material includes recycling and revision tasks at the end of each module and this guide contains quizzes after each second module and an end-of-course test. Of course, more recycling can be incorporated, particularly of vocabulary, collocations and functional language. One way to do this is with a revision activity at the start of each lesson. Below are some possibilities requiring little preparation:

Back to the board - The students work in pairs or groups. One person sits so that they cannot see the board. The teacher writes a word or phrase on the

board and each group tries to make their colleague say the word by defining it or providing examples. This can be done as a competitive game.

Pairs word race - Put the students into two groups. Each group chooses five words from the last lesson(s). The students pair up with a partner from the other group and take turns trying to make their partner say each word on their list using definitions or examples. Again, this can be a competitive task.

Hangman - This can be played with the group as a whole. The students select a letter of the alphabet and try to guess the vocabulary item. If the students guess the word then they win; if they do not then the teacher wins.

Wordsearch - A wordsearch is easy to make and can be a useful way to revise items taught previously. There is a grid with letters and some hidden words. The task is to find some vocabulary items which run in any direction (horizontally, vertically or diagonally).

Spoken gapped texts - You can use a text from the previous lesson or use one from the beginning of the lesson at the end of it. Simply read the text out replacing certain words with 'something' and ask the students to provide the missing word each time you do.

Anagram – The teacher writes some vocabulary items from the previous lesson on the board with the letters jumbled up and asks the students to write them out correctly.

LESSON NOTES

Professional area: electrics and electronics

Professional group: electrics, electronics and energy engineering

Business: railway infrastructure management

Profession: railway traffic control automation technician

Qualification symbol: EE.23.1.

Module: Installation of rail traffic control devices and systems

EE.23.1. Installation of rail traffic control devices and systems

SCREEN 1

Cover page

SCREEN 2

Dialogue video

Lead-in

To introduce the topic and generate some interest you can show the class the first screen (image) of the video and ask them some questions such as:

Look at the people in the video, where are they?

What are they doing there?

What is their job?

What is the relationship between them?

Why are they carrying tool boxes?

What kind of works are needed to modernise the rail network?

With a less confident group it is better to write these questions on the board.

Encourage any students who might have done some modernisation work to share their experience with the group.

Video

Listening for gist (1)

Tell the students that they are going to watch a video episode entitled “*Railway upgrade*” and ask them to check if any of their predictions were right and to focus on the main topic of the conversation.

With a weaker group it might be advisable to check/explain/pre-teach some vocabulary items, e.g.

mount (verb) = fix something to a wall, in a frame, etc., so that it can be looked at or used

principle (noun) = a basic idea or rule that explains or controls how something happens or works

correspond to (verb) = match or be similar or equal

exceed (v) = be greater than a number or amount, or to go past an allowed limit

face forward (v) = turn someone or something to the front

provided that (conjunction) = on the condition or understanding that

assembly (n) = the process of putting together the parts of a machine or structure

distribution (n) = the process of giving things out to several people, or spreading or supplying something

in line with binding legal regulations – zgodne z obowiązującymi przepisami prawnymi

exemption (n) - odstępstwo

In case of problems with understanding a term it is best to ask other students for explanation, give a synonym/definition in English or refer the students to

the glossary available at the end of the module. If nothing works, sometimes the only option is to use a Polish equivalent/direct translation of an item.

After watching the video students compare their answers in pairs. In feedback, ask the students to give you the answers open-class and make sure you clarify any doubts.

Listening for detail (2)

Exercise 1

Tell the students to read the sentences in Task 1 carefully and decide if they are TRUE or FALSE. They can do it individually or in pairs.

Allow some time and deal with any unknown vocabulary so that it does not get in the way. Then they can watch the video again and check the answers. The students compare and discuss their answers before open-class feedback. (Some more advanced classes might not need to watch the video again)

Answers:

1. T 2. F 3. F 4. T 5. F 6. T 7. F 8. T

During feedback encourage the students to justify why some of the answers are false and to give some explanation.

SCREEN 3

Exercise 2

Suggested instructions:

Now you are going to watch the episode again, this time pay attention to details and do exercise number 2. Now, you have got some time to read through the questions and possible answers. Do not hesitate to ask me for clarification if you do not understand something.

After the second watching and listening to the video the students compare their answers with their partner before the class check.

Answers:

- 1) A. install trackside signals.
- 2) A. principles of erecting trackside signals.
- 3) C. semaphore and colour light signals.

- 4) B. at stations.
- 5) C. 4 m.
- 6) B. on the right, looking in the direction of travel.
- 7) A. on the outside of the tracks.
- 8) C. The director of the Bureau of Control Engineering and Telecommunication at the head office of Polish Railways.

Feedback:

1. They are going to deal with devices used to emit optical signals related to train movements.
2. The engineer is talking about the rules for devices used for signalling.
3. These signalling devices direct traffic day and night.
4. Semaphores cannot be erected in places where trains stop.
5. In the middle of the film, the engineer is talking about the rules for signals.
6. Signals are erected in such a way that they are clearly visible.
7. Signals are placed in such a way that they do not interfere with trains coming from the opposite direction.
8. Such matters are reported to the head of a special section of Polish Railways.

Post-listening Lexis and Pronunciation

The students might struggle with pronunciation of some vocabulary items. In that case, you can practise some words, e.g. *dwarf*, *exceed*, *modernisation*, *principles*, *distribution*, *devices*, *guidelines* and so on. Try to note any incorrect pronunciation and drill the difficult items using the strategy:

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2. THE STUDENTS REPEAT CHORALLY
3. THE STUDENTS REPEAT CHORALLY AGAIN
4. THE TEACHER HIGHLIGHTS KEY ASPECTS OF THE TARGET LANGUAGE
5. THE STUDENTS REPEAT CHORALLY
6. THE TEACHER NOMINATES INDIVIDUAL STUDENTS TO REPEAT INDIVIDUALLY WITH CORRECTION AS APPROPRIATE

7. THE STUDENTS REPEAT CHORALLY TO FINISH

Extra idea

Less confident students can benefit from acting out the dialogue. You can distribute the tapescript and the students can read their roles in pairs. If they enjoy the activity, ask them to switch the roles and read the dialogue once more. More advanced students can try to act out the conversation from memory, however, let them refer to the tapescript from time to time. Monitor the process and note any pronunciation problems. Then drill chosen items using the technique mentioned above.

Tapescript:

Title: "Railway upgrade"

(J): We'll be mounting side-track signals today. Based on their structure, they are divided into position light signals and colour light signals. The former are no longer used in the modern railway construction industry or during modernisation works.

(W): Are we supposed to just mount the poles and signals or perhaps we should place the dwarf signals as well?

(J): Just the regular ones. Dwarf signals mustn't be placed along the lines and at the stations located by the main railway routes.

(W): What are the principles of mounting the signals?

(J): They should be hung or placed right next to the track they correspond to so that they are clearly visible. The maximum distance between a signaller and the track mustn't exceed 4 metres.

(W): Are the procedures the same when signals are mounted at the stations and by the single- and double-track railway?

(J): I'm afraid not. When it comes to the stations, signals are put on the right side of the track they correspond to, facing forward. In case of single-track

railway, the signal should be mounted also on the right side, provided that the track is more than 10m off the signal, or on the left side if the height difference from the platform exceeds 2.5m. This is similar in cases of double-track railway. The signals are placed on the outer side of the track - on the right side for the right track and on the left side for the left track, facing forward.

(W): It seems fairly reasonable.

(J): It is. But let's not forget that the assembly and distribution of signals must be in line with binding legal regulations specified by the Polish Railway Lines JSC. Any exemptions have to be authorised by the Director of the Bureau of Automation and ICT of the head office of the Polish Railway Lines JSC.

(W): I'll keep that in mind. Let's get down to work!

SCREEN 4

Instructional video

Lead-in

Tell the students that they are going to watch an instructional video *"Railroad traffic signalling devices"*.

Ask them some questions, e.g.:

How important are these devices?

Why are such devices necessary?

What kinds of signalling devices do you know? What is their role?

Firstly, play the video without sound and ask the group to name/recognise as many devices as they can and specify their function.

Listening for detail

Exercise 3

Suggested instructions:

You will now watch the video with sound. Please focus on Task 3. You will have to complete the sentences using the words/expressions from the source list.

Now read the sentences and try to fill in as many gaps as you can before we watch the film. Ask for explanation if you do not understand something.

With a less confident class you might need to explain/pre-teach some vocabulary items, e.g.:

regarding (prep) = in relation to; about - dotyczący

shunting (n) – ruch manewrowy

distinguish (v) = notice or understand the difference between two things

derailer - wykolejnica

steel wheel crowder (n) – stalowa płoza

level crossing (n) -przejazd kolejowo-drogowy

rolling stock (n) - tabor

fouling point (n) – ukres chronionego rozjazdu

inherent (adj) = existing in something as a permanent, essential, or characteristic attribute

railroad turnout (n) - rozjazd

moveable (ad) switch point (n) – ruchoma iglica

immovable (adj) switch point saver (n) – nieruchoma opornica

constitute (v) = combine to form (a whole) - stanowić

adjust (v) = change something slightly, especially to make it more correct, effective, or suitable

steer railroad traffic (n) – sterować ruchem kolejowym

increase (v) = (make something) become larger in amount or size

capacity (n) – przepustowość

verify (v) = check

central interlocking control machine (n) – nastawnica centralna

vital (adj) = important, significant

impact (n) = influence

After watching and listening, the students compare their answers with a partner before open-class feedback. It might be necessary to play the video once more with a weaker class.

Answers:

- 1) signal
- 2) uncontrolled
- 3) tracks
- 4) Switches
- 5) turnouts
- 6) rail traffic
- 7) capacity
- 8) safety

Feedback:

1. A signalling device.
2. A derailer prevents unplanned train passage.
3. Parallel strings of rails enabling trains to travel.
4. The element of the track consisting of stock rails and switch blades.
5. Structures made of rails enabling the passage of rail vehicles from a main track to a diverging track.
6. Procedures and associated equipment enabling the consistent operation of various structural subsystems of the rail system.
7. The maximum number of means of transport that can travel within a unit of time through a specific element of railway infrastructure.
8. No threats.

Post-listening - Pronunciation

The students might struggle with pronunciation of some vocabulary items. In that case, you can practise some words, e.g. *shunting*, *rolling stock*, *switches*, *capacity*, *visual messages*, *approximately*, *fouling*, *inherent*, *associated with*, and so on. Try to note any incorrect pronunciation while the students are reading the sentences from Task 3 in feedback and drill the difficult items, first as individual words, then in longer chunks of language. Use the strategy:

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2. THE STUDENTS REPEAT CHORALLY
3. THE STUDENTS REPEAT CHORALLY AGAIN
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7. THE STUDENTS REPEAT CHORALLY TO FINISH

Extra option

To further focus on lexis and listening skills you can print out the tapescript of the film with some deleted words/phrases or short sentences (with a more advanced group). Students will have to listen closely to complete the gaps. Check the answers with the class and write the correct words/sentences on the board.

Tapescript

Title: “Railroad traffic signalling devices”

A signal is a side-track device used to communicate visual messages regarding railroad traffic and shunting. We distinguish dwarf signals, position light signals, railway semaphore signals, banner repeating signals, colour light signals and grade crossing signals.

A derailer is a protective device that comes in a form of a steel wheel crowder that is placed on the rail in order to provide protection in potentially dangerous places such as level crossings or train route sections and prevent the rolling stock from getting into a train’s way. Derailers should be mounted approximately 4 to 6 metres before a fouling point. They aren’t used on main tracks, rail communication tracks or electric traction systems.

A railroad switch is used to direct a running train onto one of two possible tracks. It is an inherent part of the railroad turnouts. Such a device is composed of moveable switch points and immovable switch point savers that constitute

the external rail. The switch points are adjusted to them and controlled with a drive.

An interlocking tower is a signal tower equipped with devices necessary to perform activities directly related to managing railroad traffic.

Remote control devices are designed to steer railroad traffic and fix electrical equipment installed at railway posts from a distance. They are also used to control the block signalling. Using this type of equipment aims to increase the capacity of railway lines and junction stations, and free flow of traffic, as well as reducing the costs associated with managing railroad traffic. Devices that can be remotely controlled are supposed to collect up-to-date traffic-related data with an adjustable control panel, as well as check the technical condition of signalling equipment. This includes checking the position of railroad switches and the capacity of track circuits. The remote control equipment must verify if the signals and the direction of block signalling are correctly set and pass interlocking instructions to the devices controlled with a central interlocking control machine. It is also vital that it keeps a log of information regarding devices that have an impact on the management of, and safety in, railroad traffic.

Exercise 4

The students have to choose the correct option which best completes each sentence. Open-class feedback.

Answers:

1. The invention of dynamite brought a lot of problems [**in its train**/on its train].
2. I will not let them [**derail**/unrail] our plan!
3. I think I'm [**on the right track**/along the right track] to find the best solution.
4. He got distracted and [**lost his train of thought**/got back on his train of thought] for a moment.
5. The Duchess wore a dress with an incredibly long [**train**/track] to her wedding.
6. The criminal [**covered his tracks**/left some tracks], burnt all the documents and erased all the emails.

7. I'm sorry I'm late. I was reading a fascinating book and I [**lost track of time**/lost train of time].
8. With ten thousand employees in the company, it's hard to [**keep track of**/keep train of] them all.

Extra idea

At this point you might make the students realize that a lot of words/expressions in English have different meanings depending on the context. You can explore the phrases from Task 4 by asking the students to provide an explanation/definition of each expression. Give the students some time to do the task, allow them to use the internet resources. After a few minutes check the answers with the whole class.

Answers:

- 1) **in its train** = the problems or difficulties occur as a natural or logical result of it
- 2) **derail** = to [prevent](#) a [plan](#) or [process](#) from [succeeding](#)
- 3) **on the right track** = doing something correctly or well
- 4) **lose one's train of thought** =
to forget what one was talking or thinking about
- 5) **train** = a part of a gown that [trails](#) behind the wearer
- 6) **cover one's tracks** = conceal evidence of one's activities
- 7) **lose track of time** = to forget the time and sometimes be late for something because of it
- 8) **keep track of sb** = to [continue](#) to be [informed](#) or [know](#) about someone

PERSONALISATION

In order to commit new vocabulary items/phrases to memory it is worth creating your own sentences applying to your personal experience. Therefore you can ask the learners to use the expressions from the above task in some statements which will be connected with their life/memories/family/acquaintances/work/etc. Give them a few minutes to do this exercise. Afterwards ask a few students to read their sentences to the class.

SCREEN 5

Listening

Lead-in

Begin the lesson with a short discussion. Put the following questions on the board and ask the students to discuss them in small groups. Conduct very brief open-class feedback.

Is it important to keep record of all the repairs and performed works? Why/why not?

Who should be allowed to make entries in such a document?

What should be included in the rail traffic control device inspection logbook? Why?

Listening 1 – for general information

Tell the students to listen to the recording about the rail traffic control device inspection logbook. They should note some information and focus on how many parts it consists of and what these parts include.

Open-class feedback.

Listening 2- for detail

Before you play the narration again, refer the students to Task 5 and Task 6.

Exercise 5

Lexis

Suggested instructions:

I want you to read Task 6 – there are 8 options connected with the book content. Read them carefully and then try to group them under the two categories (PART I and PART II). Then listen to the recording and check the answers.

Check the answers with the whole class.

Answers:

The first part of the inspection logbook contains:

1. types of irregularities
2. reasons for irregularities
3. activities taken to remove the irregularities

The second part of the inspection logbook contains:

1. information on the device inspection
2. information on performed works
3. information on performed treatments
4. information on changes made to devices
5. restrictions related to performed works

Feedback:

1. The first part of the inspection logbook contains information about problems that arose during work operation.
2. The second part of the inspection logbook of is related to the maintenance of devices and activities performed during their checking.

Exercise 6

Lexis

The students have to match the words with the opposite meaning using the words from the source list. There are some words they will not need to use.

The students can work in pairs. After a few minutes check the answers with the whole group.

Answers:

1. manual - **automatic**
2. necessary - **optional**
3. filled - **blank**
4. moving - **stationary**
5. damaged - **repaired**
6. on track - **derailed**
7. maximum - **minimum**
8. remove - **install**

Extra idea

Exercise 5 shows an efficient way of learning new vocabulary – forming pairs of words having opposite meaning. Encourage the students to keep a record of such pairs and ask them to make some sentences which contain such paired words. Give them an example sentence and write it on the board:

There are a lot of automatic devices at this site but manual workers are also needed here.

Let the students work in pairs and after a few minutes ask some learners to read out their sentences.

Post-listening grammar practice (THE PASSIVE VOICE)

All the 3 recordings in this module are connected with technical language and contain a lot of passive voice structures. At this point you might focus on this grammar aspect.

Suggested steps:

First, you could ask the students to find some examples in the tasks/tapescript and underline them. Later you should elicit the basic rules of forming sentences in the passive and usage connected with the structure from the group. Remind them of regular/irregular verb forms and provide some grammar exercises. Finally, ask them to write some sentences in the passive related to their work. They will read them out.

If you decide to follow up with exploring some useful language, bear in mind the following steps:

- present the target language in context and co-text to enhance understanding
- students notice/ focus on the target language
- deal with its meaning and use
- deal with its form, highlight it
- provide a controlled practice task to check if students got to grips with both its meaning and form
- provide some thorough pronunciation practice, highlight the features of connected speech, prominence, word stress, intonation; drill the whole sentences; be energetic and make it fun; use a variety of drilling techniques (choral, individual, pair, disappearing, substitution drills)

- to put it all into practice, provide a freer-practice activity, mirroring real life situations, where students use the target language in a natural context in speaking or writing

Tapescript

Inspection of railway traffic control devices

The rail traffic control device inspection logbook is a document that should be found at every signal box and level crossing equipped with traffic control devices. The logbook should be prepared by the head of the section and bear his or her signature and stamp. Entries in the logbook may only be made by the employees who work at a given site. All entries should bear a date, time and the employee's signature.

This logbook contains a list of employees who, in accordance with their competences, are authorised to repair minor defects themselves and carry out work on active, locked and sealed devices within the signal box, as well as to perform repairs of switch point blades and their accessories. This group of employees includes: chief of the section, station master, master control engineer, control engineer, chief engineer, and diagnostic technician.

The inspection logbook consists of two parts. Irregularities in the functioning of devices, the reasons for their occurrence, and actions taken to remove them are to be logged in the first part.

The second part contains information about works performed, procedures carried out by maintenance or diagnostic staff, information on equipment inspections (and the resulting introduction or lifting of restrictions), maintenance or diagnostic procedures, and changes introduced to equipment.

Inspection logbooks must not be carried out of the signal box or taken from the controlgear cabinet or the level crossing until they are complete. Filled

logbooks are kept by the chief of the section for one year, after which the logbook is archived.

SCREEN 6

Lexis – game MEMO

Tell the students to form pairs of Polish-English equivalents. The students work individually before comparing their answers with partners. Brief open-class feedback.

Answers:

1. infrastruktura kolejowa - rail infrastructure
2. semafor - semaphore
3. dyżurny ruchu - signalman
4. posterunek dróżnika – level crossing signal box
5. ruch kolejowy - rail traffic
6. rozjazd - turnout
7. napęd zwrotnicowy – point machine
8. wykolejnica – derailer

SCREEN 7

Exercise 7

Lexis

This task checks if the students understand the meaning of the target language from the previous stages. The students mark the statements true or false and check their answers in pairs. Open-class feedback. Encourage the students to explain why some sentences are false and ask the class to correct them so that they contain true information. Optionally, set it as homework.

Answers:

1. T 2. T 3. F 4. F 5. T 6. F 7. T 8. T

Exercise 8

Lexis

Instructions: Match the pictures with the correct term. The students do the task individually or in pairs. Open-class feedback.

Answers:

1. derailer



2. point machine



3. turnout



4. crossing signal box	
5. semaphore	
6. fouling point sign	

Feedback:

1. Device protecting uncontrolled displacement of rolling stock.
2. Three types can be distinguished: manual, mechanical and electric.
3. Structures made of rails that make it possible to redirect rail vehicles from a main track to a diverging track.
4. It is located near the intersection of a railway line and a road. It is equipped with devices used to stop road traffic when rail vehicles are travelling through a level crossing.
5. A railway signalling device that is used to control railway traffic.

6. Marks the spot where the clearance envelopes of adjoining tracks meet.

SCREEN 8

Reading

Lead-in

To begin, you can ask the class what they know about siding tracks, their functions and how we can protect them.

Pre-reading

Test what the students already know or remember by putting the following words on the board (or any others that you opt for):

mainline sidings (n)

distinguished (adj)

due to (prep)

secured (adj)

switch (n)

stub track (n)

derailer (n)

inclined (adj)

carriage (n)

roll back (v)

diverge (v)

branch off (v)

ensure (v)

fouling point (n)

additional (adj)

turnout (n)

Ask them to put the words into 3 columns:

I know what it means:

Not sure :

No idea :

The students compare their answers and help each other define or translate the words. This stage encourages peer teaching and allows the teacher to monitor closely to gauge which vocabulary items are worth teaching. Teach the ones the students struggle with open-class.

Reading for specific information

Exercise 9

The students should read the sentences with gaps to be completed using the words/expressions given in the source list. Tell them to ask for clarification if they come across an unknown word/find something difficult to understand. Then they should try to complete the gaps. After that they will read the text and check the answers. Open-class feedback.

Answers:

- 1) join
- 2) point
- 3) station
- 4) Stub track
- 5) derailer
- 6) main
- 7) rail traffic-control devices
- 8) fouling points

Feedback:

1. The place where the main line joins a siding.
2. A component of the track, which includes stock rails and point blades, used to divert the vehicle from one track to another.

3. Tracks that are located near a place where trains stop.
4. A track terminated with a bumper that provides a way to escape sideways collisions with other trains or rolling stock.
5. A device that protects against uncontrolled displacement of rolling stock.
6. Setting the switch in such a way that the train travels along the main track.
7. Technical measures that enable rail vehicles to move on track systems efficiently, safely and in an organised manner.
8. A point near converging tracks before which rolling stock must stop not to block the other track.

SCREEN 9

Exercise 10

Lexis

The students are asked to complete the crossword. It can be done as homework.

Answers:

1. Siding
2. Protection
3. Stub
4. Derailer
5. Track
6. Carriage
7. Turnout
8. Signal

Post-reading

You may ask the students to write a short summary of the text (2-3 sentences). Emphasise the fact that a good summary must include the most important information. The students should work individually. Monitor and offer help if necessary. After a few minutes ask some willing students to read out their piece.

Language feedback

Put some good, as well as some incorrect examples of students' language on the board. First, ask them to decide which ones are correct and mark them with a tick. Now, tell them to improve or correct the rest in pairs. Conduct thorough feedback in class, upgrading their language and correcting any mistakes.

DOCUMENT

Title: Protection of siding tracks

Station sidings and **mainline sidings** are distinguished due to the location of the siding track. The point where a siding joins must be secured with a switch (trap point) that redirects to a stub track or a **derailer**.

Where station sidings are used, if the **siding track** is inclined towards the main tracks and there is some concern about the possibility of carriages rolling back on the station tracks, use a trap point. This must be located as close to the contact point with the switch as possible. In other cases a derailer must be used. It is also necessary to use a derailer when the siding is connected with station sidings.

In its main position, the switch which diverges to a siding should be set to ensure travel on the track from which the siding branches off, while the switch of a stub track should be set to ensure travel on the stub track.

It should also be remembered that if the distance between the fouling point of the siding turnout and the turnout of the **stub track** is greater than the length of a carriage, this section cannot be controlled by rail traffic-control devices. An additional derailer, which is installed between the **fouling points** of the turnouts, is used for protection of the main track.

SCREEN 10

Lexis – game HANGMAN

Exercise 11

The students must choose some letters and try to guess the words/expressions. There is also a definition of the hidden word provided to help them.

Answers:

1. Semaphore - transmits a light signal
2. Level crossing gates - a road barrier lowered at railway crossings
3. Crossing keeper - a person who guards and operates a level crossing
4. Switch - used to redirect vehicles from one track to another
5. Signal box - the site where all activities directly related to operation of rail traffic are performed
6. Track bed - an embankment on which sleepers and track are laid

7. Station - a place where trains or other means of transport stop
8. Signal - trackside device used to emit optical signals related to train movements

Feedback:

1. Railway signalling device used to control railway traffic.
2. A guarding device at a level crossing - a bar, for example - which blocks the entire width of the road.
3. He works at a post which can be located near an intersection of a railway line and a road.
4. A component of the track that includes the stock rails and point blades. It is used to divert the vehicle from one track to another.
5. A crossing keeper works there.
6. The place where railway or tram tracks run.
7. A place from which you can start your journey by train.
8. A signalling device.

Exercise 12

Lexis

The students should match pairs of words. They can do it in pairs. Open-class feedback.

Answers:

1. Trackside signals - mechanical and light
2. Point machines - manual, mechanical, electric
3. Siding track - station sidings and track sidings
4. Derailer - safety device
5. Control panel - a set of information about the traffic situation
6. Rail traffic-control devices inspection logbook - a list of employees
7. Central interlocking frame - passing commands to controlled devices
8. Semaphore - used to control railway traffic

EXTRA PRACTICE – guessing game - DEFINITIONS

To make the students revise and practise some key vocabulary items and the passive structures you can play a guessing game with them.

Explain the rules and give an example.

Suggested instructions:

We are going to play a game. You will have to guess the word/expression after hearing a definition describing it. Let me give you some examples:

It is a side-track device which is used to communicate visual messages.

(a signal)

It is a person who is qualified to make diagnoses of railway equipment and systems. (a diagnostic technician)

Write the following structures on the board:

*It is a device which is used/which is found/which is placed/which is made of
..... + NOUN*

*These devices are designed to/are used to/can be controlled to/are supposed to
..... + VERB*

This person is authorised to/is trained to/is qualified to + VERB

Give the students a few minutes to write definitions of 5 vocabulary items they choose from previous lessons. They should use the structures provided on the board. Then they read their definitions and the group tries to guess the answers.

Language feedback

Put some good, as well as some incorrect examples of students' language on the board. First, ask them to decide which ones are correct and mark them with a tick. Now, tell them to improve or correct the rest in pairs. Conduct thorough feedback in class, upgrading their language and correcting any mistakes.

SCREEN 11

REPORT

LESSON NOTES

Professional area: electrics and electronics

Professional group: electrics, electronics and energy engineering

Business: railway infrastructure management

Profession: railway traffic control automation technician

Qualification symbol: EE.23.2.

Module: Operation of railway traffic-control devices and systems

EE.23.2. Operation of railway traffic-control devices and systems

SCREEN 1

Cover page

SCREEN 2

Dialogue video

Lead-in

To introduce some fun into the learning process you can use some jokes. First, ask your group if they know any funny jokes/stories/puns connected with trains or their job. If the answer is yes, elicit them from some students. You can also tell them some jokes, examples:

- 1) "I don't want to drive you crazy, but I do have a loco-motive." (You might need to explain the word *loco* = *insane*)
- 2) A large two engine train was crossing America. After they had gone some distance one of the engines broke down. "No problem," the engineer thought, and carried on at half power. Farther on down the line, the second engine broke down, and the train slowed to a dead stop. The engineer decided he should inform the passengers about why the train had stopped, and made the following announcement:

“Ladies and gentlemen, I have some good news and some bad news. The bad news is that both engines have failed, and we will be stuck here for some time. The good news is that you decided to take the train and not a plane.”

3) Said to a railroad engineer: “What’s the use of having a train schedule if the trains are always late.”

The reply from the railroad engineer: “How would we know they were late, if we didn’t have a schedule?”

The last two jokes are connected with the video the class is going to watch. Ask them to predict the topic of the episode (delays of trains caused by a switch failure).

Before watching the video it might be a good idea to revise/check/pre-teach some vocabulary items, such as:

tough (adj) = difficult to do or to deal with

failure (n) = the fact of something not working, or stopping working as well as it should - awaria

undue (adj) = more than is necessary, acceptable, or reasonable - nadmierny

switch (n) = zwrotnica

critical (adj) = important

spanner (n) - klucz

keeper (n) - zamek

screw (n) - śruba

occur (v) = happen

turnout (n) - rozjazd

radius/radii (n) – promień/promienie

exceed (v) = be greater than a number or amount, or to go past an allowed limit

curve (n) - łuk

stretch (n) = a continuous area of land or water - odcinek

dispatcher (n) - dyspozytor

Listening for gist (1)

Ask the students to watch the video and check if their guesses were correct. Put some questions on the board to be answered after the students see the episode.

Who are the people?

What do they have to do?

What do they need to take with them?

What other activities are planned for that day?

Listening for detail (2)

Exercise 1

Tell the students to focus on Task 1 – they have to read the sentences and decide whether they are TRUE or FALSE. If they do not understand something, explain it to them. First, they have to decide on the T/F answers, then they will watch the video to check. Choose different students to read one sentence and answer, if a sentence is false, ask them why.

Answers:

1. Operating sections are responsible for technical maintenance of rail traffic-control devices and, in particular, for removing all malfunctions and irregularities. (T)
2. Switches are used to redirect moving rolling stock to one of two tracks. (T)
3. Switches are also called turnouts. (F)
4. Switches are classified as internal traffic-control devices. (F)
5. To block signals and switches, keys and locks are used in their respective positions. (T)
6. Derailers are used to prevent unauthorised entry of a train into the route of another item of rolling stock. (T)
7. An emergency telephone is a means of communication with the controller. (T)

8. The radii of diverging track curves determine the type of train that can use them. (F)

SCREEN 3

Exercise 2

Tell the students to look at Task 2, read the instructions, questions and options of the multiple-choice exercise. Encourage them to ask questions if they do not understand any vocabulary items. After a few minutes the class will watch the episode again. After that let them check the answers with peers before you conduct open-class feedback.

Answers:

1. B. there are big train delays.
2. B. the switch.
3. B. keys, locks and bolts.
4. A. East Warsaw.
5. A. travelling speed.
6. C. 40 km/h.
7. B. traffic was limited.
8. A. the turnout inspections log.

Feedback:

1. The employees need to handle a failure which causes the trains to arrive late at their destinations.
2. A component of the track which includes stock rails and point blades, used to route vehicles from one track to another.
3. Employees will need, among other things, the components of a bolted connection.
4. Return to the middle part of the film, one employee is asking the other where the fault occurred.
5. It affects the allowable train speed.
6. When compared with other cases, the train has to travel slowest at this distance.
7. Trains in that area had to slow down.
8. A failure of this kind needs to be described in a document that relates to rail structures which enable diversion of rail vehicles from a main tract to a diverging track.

Post-listening

You can practise pronunciation of some words the students are struggling with, e.g. *tough, failure, undue, critical, screw, occur, radii, curve, etc.* First, drill them individually, then in longer phrases so that they can see them in context. Words are better remembered and then used naturally if we learn them as chunks of language, not in isolation. Remember to follow the pattern:

1. THE TEACHER MODELS THE TARGET LANGUAGE THREE TIMES
2. THE STUDENTS REPEAT CHORALLY
3. THE STUDENTS REPEAT CHORALLY AGAIN
4. THE TEACHER HIGHLIGHTS KEY ASPECTS OF THE TARGET LANGUAGE
5. THE STUDENTS REPEAT CHORALLY
6. THE TEACHER NOMINATES INDIVIDUAL STUDENTS TO REPEAT INDIVIDUALLY WITH CORRECTION AS APPROPRIATE
7. THE STUDENTS REPEAT CHORALLY TO FINISH

Tapescript:

Title: "Switch failure"

(M): Hello!

(E): Hi! It's good you've come early. It looks like we have a tough day ahead of us.

(M): Why's that?

(E): There's been a switch failure again and we need to go and see what's wrong. There's an undue delay in railroad traffic.

(M): Argh, not again. The switches are critical for safe railroad traffic. No wonder there's a delay.

(E): Let's pack our stuff and go and see what the problem is.

(M): We have to take the spanners, keepers and screws.

(E): When we're there, we'll have to check if the signals work OK.

(M): Perhaps it's a pole with a head on top of it or the one with a head on a jib directed towards the track. Where has the switch failure occurred?

(E): Right behind the East Warsaw station. That's where the turnout to Białystok is.

(M): We have to remember to check the radii of the track transition curves. This is because they condition the speed of trains running on the track.

(E): OK. The standard radius is between 190 m and 300 m and the train speed should not exceed 40 km/h. This is rather uncommon, but in the case of a track curve whose radius is 500 m long, the train is allowed to run 60 km/h or even 100 km/h provided that the radius is at least 1200 m.

(M): We'll need to check everything very carefully and decide if the switch is operational and if it is necessary to continue to limit the railroad traffic on that stretch of railway.

(E): Please remember to take the emergency mobile phone as we need to be in direct contact with the dispatcher at all times. We can inform them of the cause of the failure, that it has been removed and at what time as they need to log it.

(M): Sure. I'll go and get it.

SCREEN 4

Instructional video

Lead-in

Ask the group some questions like:

How can we control railway traffic?

How important is this operation? Why?

What devices are used for that purpose?

Pre-teach/check/explain some vocabulary items before listening, e.g.:

manual (adj) = done with the hands

comprise (v) = consist of

adjustment (n) = a small alteration or movement made to achieve a desired fit, appearance, or result - regulacja

points lever (n) = ręczny napęd zwrotnicowy

remotely (adv) = from a distance

shorten (v) = become shorter or to make something shorter

implement (v) = start using a plan or system

interlocking (n) = nastawnica

knob (n) - pokrętło

relay room (n) - przekaźnikownia

circuit (n) - obwód

Listening (1)

Play the instructional video without sound. The students will just see the devices/systems used to control railway traffic and try to recognise/name them. Open-class feedback. Write the correct names on the board.

Answers:

- manual mechanical devices
- centralised mechanical devices
- semaphore signals
- centralised mechanical devices
- electro-mechanical interlocking
- Route Relay Interlocking

Listening for gist (2)

This time the group will see the pictures and hear the descriptions. The students should focus on the function of a given device/system and note some important information. Before you conduct open-class feedback, let the students compare their notes with their classmates.

Listening for detail (3)

Exercise 3

Refer the group to Task 3, ask the students to read the source list and the sentences with gaps. If they find something unclear, they should ask you for explanation. Encourage them to complete the sentences prior to listening.

The group will listen to the recording. Let the students check the answers with their partners before open-class feedback.

Answers:

1. manually
2. Switches
3. levers
4. wires
5. lever frame
6. electric
7. relay room
8. frames

Feedback:

1. These activities are performed by employees.
2. A component of the track that includes stock rails and point blades. It is used to direct vehicles from one track to another.
3. They make it possible to set mechanical signalling devices.
4. A part of the machinery that is located between the driving engine wheel/clutch and the power receiving equipment wheel/clutch.
5. A device in the control room that consists of levers, cranks and switches.
6. These systems are designed in various combinations.
7. A room where the components of interlocking, control and monitoring systems are located.
8. Located in a single central place.

SCREEN 5

Exercise 4

The students are asked to choose the correct option which means the same as the underlined part of the sentence. Deal with any problems connected with understanding. The learners work individually. Check the answers with the whole group.

Answers:

1. It looks like we have a tough day ahead of us.
a) **appears there's**
b) resembles
c) seems odd there should be
2. No wonder there's a delay.
a) **It's no surprise that**
b) I can't imagine
c) It's impossible that
3. Perhaps it's a pole with a head on top of it or the one with a head on a jib directed towards the track.
a) **It might be**
b) It must be
c) It cannot be
4. We'll have to check if the signals are working OK.
a) **whether**
b) in case
c) whenever
5. This is because the track transition curves condition the speed of trains running on the track.
a) **This is due to the fact that**
b) The consequence of it is that
c) It results in
6. It's good you've come early.
a) **you've arrived before the scheduled time**
b) you're here on time
c) you got delayed

7. This is rather uncommon, but in the case of a track curve whose radius is 500 m long, the train is allowed to run 60 km/h.
- a) **It doesn't happen very often**
 - b) Seldom am I forced to admit
 - c) This solution is gaining popularity
8. Please remember to take the emergency mobile phone.
- a) **Don't forget**
 - b) You're making me say it again
 - c) I'll remind you

Extra idea

It seems reasonable to discuss the meaning of all the options, not only the correct answers as this will make the students aware of numerous grammar aspects. In this way they will revise a lot and the teacher can determine which grammar points should be reviewed.

If you decide to follow up with exploring some useful language, bear in mind the following steps:

- present the target language in context and co-text to enhance understanding
- students notice/ focus on the target language
- deal with its meaning and use
- deal with its form, highlight it
- provide a controlled practice task to check if students got to grips with both its meaning and form
- provide some thorough pronunciation practice, highlight the features of connected speech, prominence, word stress, intonation; drill the whole sentences; be energetic and make it fun; use a variety of drilling techniques (choral, individual, pair, disappearing, substitution drills)
- to put it all into practice, provide a freer-practice activity, mirroring real life situations, where students use the target language in a natural context in speaking or writing

Tapescript:

Title: "Rail traffic-control devices and systems"

Manual mechanical devices comprise all mechanisms necessary for adjustment works performed in the place where the adjusting element is located. They include a points lever, which is used for adjusting switches.

Centralised mechanical devices allow operating railroad switches and signals remotely by operating levers. Thanks to this, the adjusting time of guiding railway trains is shortened.

These devices are the semaphore signals. Their role is to transmit information with the use of lever, a line shaft and a signal box.

Centralised mechanical devices include a mechanical interlocking. It is used to implement the relation between the individual adjusting elements, such as switches, derails, the blocks of the blocking system or junction interlocking, and the signals. Thanks to the use of interlocking, it's possible to shorten the time of controlling the route of the train.

In the electro-mechanical interlocking, also referred to as power interlocking, all adjusting subassemblies are centralised, so the adjustment of switches, derailleurs or signalling devices is done by means of the electric drive. The working between separate adjusting operations is regulated with switches, which are operated mechanically. The power interlocking however, also contains electrically operated parts, such as knobs.

Route Relay Interlocking is the system of mechanisms located in the field and operated by the relay room that connects the elements of this system by means of cable network. Thus switches and signals can be controlled either individually or all at once. The basic components of such a system include a set of relays, the control panel, the route display panel, electric drives, light signals and electrical track circuits.

SCREEN 6

Listening

Pre-listening

Ask the group some questions:

What do you know about rail traffic-control systems?

What is the role of technology in them?

How should we control their efficiency?

Listening (1)

Ask the students to pay attention to some general information connected with rail traffic-control systems. They can take notes. Open-class feedback.

Listening (2)

Distribute the tapescript of the recording with some words deleted - 10 items should be enough, you could white out, e.g.:

*1) responsible 2) vehicles 3) based 4) development 5) implementation
6) interface 7) supervision 8) remote 9) multiple 10) obtain*

Ask the students to listen and complete the gaps. Ask individual students to give the answer to a given gap. Write the correct answers on the board for the students to check the spelling.

(For less confident students you can prepare a source list with the deleted words put in a random order.)

Exercise 5

The students' task is to complete each gap with a single preposition. Encourage the students to work in pairs. After a few minutes conduct open-class feedback.

Answers:

The rail traffic-control system is responsible **[for]** the safe operation of railway vehicles within the railway network. This kind **[of]** systems relied **[on]** relays and computer systems.

Today, the Polish rail-traffic control system is based **[on]** a combination of computer, relay and mechanical devices. Thanks **[to]** the development of microprocessor technology, the implementation of hybrid systems that combine relays and computers was possible.

This system is made **[of]** a host system. One may treat it **[as]** an interface between the interlocking system and the operator. The host system is a set of devices that help controllers supervise and control train traffic. When a conflict is detected, the system is capable **[of]** adjusting the railway traffic.

Extra idea

At this point you can give the class some tips connected with learning English more efficiently. They should learn words together with prepositions so when they record new vocabulary items, they ought to include prepositions.

Encourage them to form lists of expressions containing the same preposition. Sometimes these phrases can have similar meaning. Write some examples on the board:

AS:

PERCEIVE AS/SEE AS/CONSIDER AS

ON:

DEPEND ON/RELY ON/COUNT ON

AT:

GOOD AT/EXCELLENT AT/PROFICIENT AT

Another idea is to form sentences with prepositional phrases, preferably connected with the students' experience to make them more personal, and thus easier to remember.

Tapescript:

Title: Rail traffic-control systems

The rail traffic-control system is responsible for the safe operation of railway vehicles within the railway network. The first systems of this kind were based on relays and computer systems.
The current Polish rail-traffic control system is based on a combination of computer, relay and mechanical devices. The development of microprocessor technology has contributed to the implementation of hybrid systems that

combine relays and computers.
This system consists of a host system, which can be considered as an interface between the interlocking system and the operator. The host system is a set of devices that support controllers in the supervision and control of train traffic. When a conflict is detected, the system is able to adjust the railway traffic.
Remote-control systems are used in the remote operation of rail traffic-control devices, which allows one controller to control multiple traffic posts.
The next group are line systems responsible for managing the passage of trains between stations. They can be line block systems, automatic level-crossing warning systems and remote-control devices.
Railway traffic-control systems must be tested to ensure that they meet all of the applicable standards. They must also obtain a certificate permitting their use on railway lines before entering service.

Exercise 6

Lexis

The students are told to match the expressions with the descriptions. After a few minutes conduct open-class feedback.

Answers:

rail vehicle	a vehicle moving on tracks
controller	a person responsible for the safe movement of trains (also called a signalman)
railway line	also called a railroad
certificate	a document confirming compliance with certain requirements
switch	element of the track used to redirect trains
signal	this is used to control railway traffic; it can be a colour light or a mechanical (semaphore) device
signal box	a location from which efficient and safe train traffic is

	ensured
rail	... traffic-control system

SCREEN 7

GAME MILLIONAIRES

Give the class some instructions:

They can choose an answer themselves, use 50/50 option, phone a friend or ask the audience.

Play the game for a given period of time, the winner gets the highest score.

Answers/Hints:

1. derailer

Hint: They are used on siding tracks to protect running and shunting trains from being hit by trains coming from the siding track.

2. 100 km/h

Hint: At such a distance, the permitted speed is the highest.

3. directing the rolling stock to one of two track

Hint: The switch is an element of the track that consists of stock rails and point blades.

4. manage turnout switches and signals remotely from a single place using levers

Hint: Thanks to this measure, route setting is shortened.

5. transmit signals by means of a lever, wires and pulleys

Hint: A signal is a trackside device used to transmit optical signals related to train movements.

6. safe movement of rail vehicles within the railway network

Hint: It is the branch of railway engineering dealing with the safety and efficiency of railway traffic.

7. trolleybus

Hint: This vehicle is powered by electrical energy drawn from overhead lines.

8. turnout

Hint: Its basic elements are: switch, crossing plate with a frog and check rails, switch rails (point blades) and setting device.

SCREEN 8

Exercise 7

Lexis

The students are told to group the words/expressions into two categories (multigap). The students check their answers with each other before open-class feedback.

Answers:

Track elements	Activities related to railway traffic
siding, turnout, derailer, tracks, interlocking lever	railway transport, traffic-control, dispatch room

Exercise 8

Lexis

The students' task is to match the pictures with the correct terms. Let them work in pairs. Open-class feedback.

Answers:

1. Illuminated diagram



2. Mechanical signal



3. Power interlocking frame



4. Light signal



5. Relay



6. Siding



Feedback:

1. The basic element of relay devices.
2. A trackside device used to emit optical signals related to train movements.
3. It serves to align individual route setting elements, such as switches or derailleurs.
4. A railway signalling device that is used to control railway traffic.
5. An electrical or electronic device designed to trigger a predetermined, sudden change of state in one or more output circuits when the appropriate input conditions are met.
6. A railroad connected to a railway line used, for example, to park a railway vehicle.

SCREEN 9

Reading

Pre-reading - running dictation

The aim of this task is to provide practice in all four skills and introduce a bit of movement into the classroom. Stick one copy of the following text somewhere outside the classroom. Put students into pairs, in each pair nominate the runner and the scribe. Runners need to run, memorise the text, and run back to the classroom to dictate it to their partners quietly. The rules are: no photos or shouting. The winners are students who finish first. When they have finished, ask them to compare their text with the original one. Distribute the whole text and let them skim through to see if they were right.

Text:

“Rail traffic-control systems can be classified in terms of their connections with railway line structures:

- Station system - consisting of controlling devices intended for rail traffic at signal boxes.
- Line system - responsible for controlling railway-traffic devices on routes. Line systems include line block systems.”

SCREEN 10

Exercise 9

The students are told to read **Task 9** – both the source list and the sentences which they will have to complete. Deal with any difficult items. Tell the students to read the whole text carefully and then to do Exercise 9. After a few minutes encourage volunteers to read the completed sentences.

Answers:

1. block systems
2. protect
3. dispatched
4. electromechanical
5. train
6. unidirectional
7. impossible
8. head-on

Feedback:

1. Devices designed to control the order in which trains are dispatched and their direction of travel.
2. This feature monitors the passage of a train and ensures that it does not collide with other trains.
3. In other words, to send off.
4. They are used on double-track lines.
5. A rail vehicle.
6. It only works in one direction.
7. The next train cannot leave if the unidirectional block system is locked.
8. A collision of two vehicles in which there is mutual and unplanned contact.

Exercise 10

The students' job is to read the statements and decide if they are TRUE or FALSE firstly, without referring to the text. Then they should read the document again and find the sentences which justify their choice. Conduct open-class feedback and tell the students to give some reasons for their choice.

Answers:

1. A rail-traffic control system can be either linear or non-linear. **(F)**
2. Line block systems can be considered a line system. **(T)**
3. Line block systems can be divided into two categories: unidirectional and bidirectional. **(T)**
4. Unidirectional block systems are usually electromechanical locks and they can be installed on single-track lines. **(F)**
5. It is possible to travel in only one direction when a bidirectional block system is applied. **(F)**
6. When a train sets off on its journey, the block system is locked, and when it returns from the journey, the block system is unlocked. **(T)**
7. Bidirectional block systems can be used on two-way traffic routes. **(T)**
8. As a head-on collision with an incoming train is possible, the purpose of bidirectional block systems is to determine the direction a train can be driven in and to prevent the risk of dispatching a train in the opposite direction. **(T)**

DOCUMENT

Title: Rail traffic-control system

Rail traffic-control systems can be classified in terms of their connections with railway line structures:

- Station system - consisting of controlling devices intended for rail traffic at signal boxes.
- Line system - responsible for controlling railway-traffic devices on routes. Line systems include line block systems. Their main role is to make sure that trains departing from operation sites to the track are monitored and protected against collision with trains coming from behind or in the opposite direction.

Line block systems can be divided into unidirectional and bidirectional. Unidirectional block systems are in most cases electromechanical locks and they can be installed on double-track lines. Use of this type of block system permits travel in one direction only and its functionality is limited to protection against rear-end collision. When the train sets off on its journey, the block system is locked, and when it returns from the journey, the block system is unlocked. When the block system is locked, it is impossible to dispatch the next train on the trail.

Bidirectional block systems can be used on two-way traffic routes. As a head-on collision with an incoming train is possible, bidirectional block systems are responsible for determining the direction from which a train may be sent and excluding the possibility that a train will depart from the opposite station.

Post reading – grammar and lexis

The text contains a few vocabulary items formed with prefixes. It is worth making the students aware of some typical meaning of given prefixes so that the learners are able to “sense” the general meaning of words.

Firstly, explain what the notion of PREFIX implies.

Answer:

Prefixes are letters which we add to the beginning of a word to make a new word with a different meaning. Prefixes can, for example, create a new word opposite in meaning to the word the prefix is attached to.

Then ask the class to underline such vocabulary items in the text. Give them the first example – *unidirectional*.

After 2 minutes elicit the remaining items and write them on the board:

bidirectional, unlocked, impossible, incoming

Add some more examples from the listening tasks from the module:

interlocking, microprocessor, subassemblies, undue, interface, uncommon, removed

Ask the students to analyse the examples and try to infer the meaning of the prefixes the words contain. Elicit the meaning from the class.

Answers:

UNI = ONE

BI = TWO

UN = OPPOSITE

IM = OPPOSITE/NOT

INTER = BETWEEN

SUB = UNDER

MICRO = SMALL

IN = INTO

RE = AGAIN

You can ask the students to search for some more words formed with the prefixes written on the board online and share their lists with the classmates.

You can also create some exercises such as:

- 1) Put some words and prefixes separately in 2 groups – the students' task is to match them to form the correct word.
- 2) Create some sentences with gaps which the students will fill in using one word containing a prefix from the source list provided.
- 3) Ask the students to make their own example sentences with given/chosen vocabulary items from the task .

You can also use some materials and resources available online.

SCREEN 11

Exercise 11

Lexis

The students are asked to guess the words. They can work in pairs. After a few minutes check the answers with the whole group.

Answers:

1. Switch gear - it is a manual drive used to set the switch
2. Derailer - prevents the train from entering the route of another train

3. Levers - used for setting the mechanical signalling devices.
4. Electric - electric drive is used for setting switches, derailleurs and signals
5. Rail vehicle - A vehicle moving on tracks is a
6. Turnout - structure made of rails enabling passage of rail vehicles from the main track to a branching track.
7. Junction interlocking - a device in the control room, consisting of levers, cranks, switches etc. used for traffic control purposes.
8. Relay room - a room where dependence and control systems components are located.

Feedback:

1. They are mainly used on sidings.
2. A device that prevents the collision of rolling stock.
3. Their movement results in the switching of the point blades.
4. This drive consists of, among other things, an electric motor with gears.
5. It is, for example, a train or a tram.
6. It consists of a switch and a frog, and switch rails (point blades).
7. They are also used to execute commands.
8. Transformers, resistors, rectifiers and other electrical system components are located in this room.

Exercise 12

Lexis

The students are to match vocabulary items with the right definitions. They can do this exercise for homework. Conduct open-class feedback.

Answers:

1. Semaphore - railway signalling used to control railway traffic
2. Derailer - a device that prevents the collision of rolling stock
3. Line block systems - there are two categories of line block systems: unidirectional and bidirectional
4. Track - two rails supporting the wheels of rail vehicles
5. Level crossing - a place where a railway line or siding is crossed by a road on the same level
6. Siding - a railway road connected to a railway line, which is used for parking railway vehicles
7. Carriage - a rail vehicle intended for transporting people
8. Signal box - a place from which efficient and safe rail traffic is ensured

Speaking

To recycle and further practise the material included in the module you can divide the class into small groups and ask them to prepare a short presentation on the topic: Traffic control devices and systems. They will have access to all the materials and online resources. Give them about 20-30 minutes to complete the task. Monitor and offer help if necessary. Each group will make their presentation at the end of the lesson. Ask the other groups to listen carefully and evaluate their performance. At the end of the lesson the class will decide which presentation was the best.

Beforehand, brainstorm some ideas applying to making a good presentation and elicit some useful expressions to be used during a presentation from the learners, then write them on the board.

Top Tips for Effective Presentations

1. Show your passion and connect with your audience.
2. Keep it simple: concentrate on your core message.
3. Smile and **make** eye contact with your audience.
4. Start strongly.
5. Divide your presentation into 3 main parts:
 - Introduction
 - Main body
 - Conclusion.
6. Prepare a plan of the presentation on paper.
7. Tell a story/include examples...

USEFUL EXPRESSIONS:

The subject/topic of my talk is ...

I'm going to divide this talk into three parts.

There are a number of points I'd like to make.

I'd like to begin/start by ...

Then/ Next ...

Finally/ Lastly ...

We've looked at...

So much for...

Moving on now to ...

The next issue/topic/area I'd like to focus on ...

I'd like to expand/elaborate on ...

Let's consider this in more detail...

What does this mean for...?

Why is this important?

A good example of this is...

To illustrate this point...

To summarise...

If I can just sum up the main points...

So, to remind you of what I've covered in this talk, ...

Paraphrasing and clarifying:

- In other words.....
- So what I'm saying is....
- To put it more simply....
- To put it another way....

I'm happy to answer any queries/ questions.

Does anyone have any questions or comments?

Language feedback

Put some good, as well as some incorrect examples of students' language on the board. First, ask them to decide which ones are correct and mark them with a tick. Now, tell them to improve or correct the rest in pairs. Conduct thorough feedback in class, upgrading their language and correcting any mistakes.

SCREEN 12

REPORT

LESSON NOTES

Professional area: electrics and electronics

Professional group: electrics, electronics and energy engineering

Business: railway infrastructure management

Profession: railway power engineering technician

Qualification symbol: EE.27

Module: EE.27.1 Installation and operation of power supply networks

EE.27.1. Installation and operation of power supply networks

SCREEN 1

Cover Page

SCREEN 2

Dialogue video

Lead-in

Speaking practice

Before watching the episode conduct a short discussion to make the students get involved in the topic and to practise expressing and supporting opinions. Tell them that they are going to analyse some statements, agree or disagree with them and explain their way of reasoning.

Elicit some useful phrases which can be used to present and justify points of view and write them on the board, e.g.:

I believe/think so because

One of the reasons to support this is
I am convinced that this is necessary as
As far as I am concerned
I completely agree with this point and to prove that
It is obvious that this is true because
I will give you some examples to convince you. Firstly, ... Secondly, ...
I completely disagree with this idea for a few reasons. To start with
I am against this statement because
The main thing is
The most important thing is
I'm pretty sure that
There's no doubt that

THE STATEMENTS TO DISCUSS:

MODERNISATION OF THE RAILWAY SYSTEM IS A MUST.

TRAINS SHOULD EXCEED THE SPEED OF 200 KM.

POLAND MUST DEVELOP HIGH-SPEED RAIL SERVICE LIKE THE TGV IN FRANCE SOON.

INVESTMENT IN RAIL TRANSPORT IS NOT NECESSARY.

IT IS NOT IMPORTANT TO TRAIN RAILWAY STAFF SO OFTEN.

Divide the students into 3 groups, each group has to choose one statement they strongly agree with and one statement they really disagree with, and prepare a few arguments to elaborate on the reasons for their choice using the expressions written on the board. After a few minutes one representative from each group will present the argumentation. Encourage the other groups to comment and add some opinions.

Listening for general information (1)

Tell the students that they are going to watch a video conversation between a man and a woman. Ask them to think about the following aspects while listening (write them on the board):

Who are these people?

What is the relationship between them?

What is the main topic of the conversation?

What needs to be prepared? Who will be responsible for that?

Depending on the level of your group, it might be advisable to check/explain/pre-teach some vocabulary items such as:

urgent (adj) = requiring immediate action or attention

the board (n) = the group of people who are responsible for controlling and organizing a company or organization

announce (v) = make a formal public statement about a fact, occurrence, or intention

tender (n) = an offer to carry out work, supply goods, or buy land, shares, or another asset at a stated fixed price – *PRZETARG* in Polish

hitherto (adv) = until now or until the point in time under discussion

in accordance with (idiom) = in a way that agrees with or follows (something, such as a rule or request)

utilisation (n) = the action of making practical and effective use of something

voltage (n) = an electromotive force or potential difference expressed in volts

assess (v) = evaluate or estimate the nature, ability, or quality of

obtain (v) = get, acquire, or secure (something)

Regardless of the level of the students brainstorm the vocabulary connected with electric circuit. Give the students 2 minutes to come up with as many words/expressions as possible. They can work in pairs.

Open-class feedback. Put the items on the board so that everybody can copy them.

ELECTRIC CIRCUIT: (suggestions)

- voltage
- current
- conduction/conductor
- generator
- insulator
- power source
- switch
- transistor
- value of frequency
- main current circuit
- power circuit
- electric traction
- electric power consumption
- running line
- plain line

Play the episode and elicit the answers to the questions. Encourage volunteers to provide the answers.

Listening for specific information (2)

Exercise 1

This is a TRUE/FALSE type of exercise. Ask the students to read the statements and decide on the answers before checking them during listening to/watching the video. If there are any doubts concerning the vocabulary, give them some explanation/synonym. After watching the episode, conduct open-class feedback. The students must give some information to support their choice (especially when the sentence is FALSE).

Answers:

1. F 2. T 3. F 4. T 5. T 6. T 7. F 8. T

SCREEN 3

Exercise 2

The students should read the questions and options in the multiple-choice task and ask for help if they do not understand anything. Deal with any difficult items before they watch the film. Open-class feedback.

Answers/Feedback:

1. A. delivery of a system with the required performance

Feedback: The contractor must take into account the line speed and the maximum train current.

2. C. construction of new, high-speed railway lines

Feedback: Modernization of the line will allow passengers to reach their destination faster.

3. A. 200 km/h

Feedback: The speed must comply with the Technical Specifications of Interoperability.

4. B. maximum power consumption of the train

Feedback: The upper limit of power consumption has been specified.

5. B. infrastructure operator

Feedback: It may be the owner or tenant of the railway infrastructure components.

6. C. the first and second answers are correct

Feedback: The required parameters apply to the primary current circuit of the power-supply circuit.

7. A. 25 kV AC

Feedback: This voltage applies to alternating current.

8. A. 2x25 kV.

Feedback: Together, it should be 50 kV.

Post-listening – pronunciation

Some vocabulary items/names might be difficult for the students to pronounce correctly. Possible words: *urgent, announce, Technical Specifications Interoperability, specify, parameter, etc.* Drill the problematic items one by one, then in some phrases/collocations/sentences following the pattern:

1. THE TEACHER MODELS THE TARGET LANGUAGE THREE TIMES
2. THE STUDENTS REPEAT CHORALLY
3. THE STUDENTS REPEAT CHORALLY AGAIN
4. THE TEACHER HIGHLIGHTS KEY ASPECTS OF THE TARGET LANGUAGE
5. THE STUDENTS REPEAT CHORALLY
6. THE TEACHER NOMINATES INDIVIDUAL STUDENTS TO REPEAT INDIVIDUALLY WITH CORRECTION AS APPROPRIATE
7. THE STUDENTS REPEAT CHORALLY TO FINISH

Tapescript

Title: “A tender”

(C): Good morning.

(W): Good morning.

(C): I'll cut to the chase because it's quite urgent. The board has decided to announce a tender for the construction of a new high-speed-line power system. According to the Technical Specifications for Interoperability (TSI) these are lines used at speeds above 200 km/h.

(W): Before, the speed standards ranged between 160 and 200 km/h.

(C): The demand for travel by train means that it is necessary to modernise the network. Your job will be to announce the tender.

(W): Okay.

(C): Please specify that the project has to be in accordance with the decision of the European Commission regarding the utilisation parameters, the speed on the railroad, the maximum amount of electricity consumed by trains, the minimum time intervals between trains and medium voltage.

(W): We'll assess the speed for a given line and the maximum electric power consumption for a train. The contractor will have to guarantee that they are able to deliver an electrical system that will make it possible to obtain the required operational parameters.

(C): During offer verification do check if the contractors have specified the type of power source and the value and frequency of the supply voltage.

(W): Of course, I'll keep that in mind. In the end, the entire power-supply system regards the main current circuit of the power circuit.

(C): Due to the use of high speed on the lines, let's agree that it must be a system that supplies a 25 kV AC electric traction.

(W): That's right. On the running line and the plain line the power supply should be supplied in a 2x25 kV configuration - where storage stabling tracks and sidings in a 1x25 kV set-up.

(C): Will you manage to put the advert together by the end of the week?

(W): Of course.

(C): So I'll wait for the initial offer. That'll be all, thank you. Goodbye.

(W): Goodbye.

SCREEN 4

Instructional video

Pre-listening task

Inform the students that they are going to watch an instructional video entitled: "Components of the overhead contact line". It is a highly technical recording so it could be reasonable to describe the elements in Polish. Show the class images without sound and ask them to recognise and describe each element. With an advanced group it might be possible to do it in English, with a less confident class, do it in Polish.

Listening (1)

Tell the students to focus on the description of each element while they are watching the video. They should be able to work out the meaning of some new vocabulary items from the context, their background knowledge and professional experience should prove helpful as well. Ask them to note down the names of all the six elements. Open-class feedback.

Answers:

1. traction substation
2. auxiliary power system
3. power supply points
4. network circuit-breakers

5. surge arresters
6. reinforcing wires

Listening (2) – for detail

You can print the tapescript and delete some words which you will put in the source list. The students will have to, first, try to complete the gaps themselves and then listen/watch the video and check their answers. Choose different students to read out the words.

Example source list:

- 1) current, 2) supply, 3) transformer, 4) overhead, 5) cables, 6) consumption,
- 7) circuit, 8) network, 9) switches, 10) protection, 11) overvoltage, 12) increase

Exercise 3

The students' task is to match the expressions with the definitions. After a few minutes check the answers with the whole group.

Answers:

Power supply	Provision of electric energy to electrical devices.
Crossing gate	A road barrier.
Disconnecter	Makes it possible to turn off the power supply in a given section of the network.
Electric current	Can be alternating or direct.
Semaphore	Signalling device located next to the railway track.
Transformer	It converts electric current into current of different parameters.
Lightning arrester	The component of the electrical circuit that protects equipment from the effects of voltage surges.
Turnout	This makes it possible for vehicles to be diverted from one track to another.

Post listening – translation

The ability to understand and sometimes translate some manuals and instructions is important in this professional area. Therefore, it might be a useful exercise to translate the text into Polish using online dictionaries, phones and students' own expertise and knowledge. They can work in pairs and translate half of the recording. The remaining part may be set for translation as homework. In that case begin the next lesson with checking it.

Tapescript

Title: "Components of the overhead contact line"

A traction substation is a power source of the Polish State Railways. This is where the alternating current (AC) is converted to 3kV direct current (DC). Traction substations are set up at a distance of 15 to 28 km from one another.

The auxiliary power system originates from the traction substation and runs along the railway tracks. Its purpose is to supply train stations and their buildings, stops, semaphores, railway crossing gates, junctions and railway traffic-control systems with electricity. These places also have to be provided with a current transformer which converts the electric power travelling through the auxiliary power systems to alternating current.

At power supply points, power cables that come from the DC busbar join with the overhead contact line at the traction substation. We differentiate cable feeders and overhead power supplies. The latter are used when it is impossible to locate the power-supply point near the station. The number of power cables on a given stretch depends on the load power consumption. The power supply can run simultaneously through two power cables. When one of them stops working as a result of a failure, the other one can take over its function.

Every power supply point is equipped with network circuit-breakers, that is disconnectors installed at particular sections of the supporting network. Polish State Railways uses knife switches for the power supply cable.

Surge arresters are the lightning protection of the overhead contact line installed on track support structures in places where there are open ends of the contact system, as well as near power supplies that don't have a busbar junction system. The distance between surge arresters cannot exceed 1,200m. When there is a considerable overvoltage in the overhead contact line the surge arrester releases the voltage to the rails.

Reinforcing wires are no longer used in modern overhead contact lines. Those that still exist serve to increase the intersection of the overhead contact line when the electrical conductivity of the line is insufficient. Reinforcing wires run along the railway line and are attached to the track-support structures. It is worth noting that they are fitted to the overhead contact line with controllers approximately every 300 m.

SCREEN 5

Exercise 4

The students are asked to choose the correct option. They can work in pairs before you conduct open-class feedback.

Answers:

1. I'll cut to the [**chase**/core/heart] because it's quite urgent.
2. [**According**/Accepting/Regarding] to the Technical Specifications for Interoperability (TSI) these are lines used at speeds above 200 km/h.
3. The demand for travel by train [**means**/translates/makes] that it is necessary to modernise the network.
4. I'll keep that in [**mind**/brain/head].
5. [**Due to**/As/Meanwhile] the use of high speed on the lines, let's agree that it must be a system that supplies the right amount of AC.
6. Will you [**manage**/handle/achieve it] to put the invitation to a tender together by the end of the week?
7. [**I'll look forward to**/I've looked to/I can't wait to] seeing the initial draft.
8. That [**will be all**/would mean everything to me/too shall pass], thank you.

Feedback:

1. You need an expression that means 'to go straight to the point'.
2. You need an expression that means 'in line with'.
3. You need the verb which introduces a result.
4. You need an idiomatic expression which means that you'll remember.
5. You need an expression that means 'owing to', 'because of'.
6. You need the verb which means 'be able to be responsible for' and is grammatically correct in this sentence.
7. You need the expression which means you hope that something is going to happen soon. Mind the grammar.
8. You need the expression which is used to say that there's nothing more you have to say to somebody and that they can go now.

SCREEN 6

Listening comprehension

Lead-in

Prepare some knowledge quiz connected with electricity, possible questions:

- 1) What are the two types of current in widespread use today?
 - 2) What abbreviations are used to name them?
 - 3) What is voltage?
 - 4) What is frequency?
 - 5) What does a transformer do?
 - 6) What is the function of a rectifier?
 - 7) What is a pantograph?
 - 8) How do you understand the term: power grid?
 - 9) What is the role of coils? And what are they?
 - 10) How can we define the term “alternating magnetic field”?
- Make it a competitive activity. Divide the students into pairs and give them sheets with questions. They will have access to the internet. The pair which first completes all the answers is the winner. Conduct open-class feedback and compare the students' answers.

Answers:

- 1)+2) direct **current**, abbreviated DC, and alternating **current**, abbreviated AC
- 3) an electromotive force or potential difference expressed in volts
- 4) the rate per second of a vibration constituting a wave, either in a material (as in sound waves), or in an electromagnetic field (as in radio waves and light)
- 5) reduces or increases the voltage of an alternating current
- 6) converts an alternating current into a direct one by allowing a current to flow through it in one direction only
- 7) a jointed framework conveying a current to a train, tram, or other electric vehicle from overhead wires
- 8) an interconnected network for delivering electricity from producers to consumers
- 9) they are electrical devices consisting of a coiled wire, for converting the level of a voltage, producing a magnetic field
- 10) a continuous electric current that periodically reverses direction, usually sinusoidally

Listening for detail

The students are going to listen to the recording about the power-supply system for overhead contact systems. Their task is to answer the following questions (put them on the board):

- 1) *What are typical DC voltages?*
- 2) *What about AC voltages?*
- 3) *What is typical AC frequency?*
- 4) *Why is one traction substation always supplied by two independent power lines?*
- 5) *What does the return system consist of?*
- 6) *What are the components of the overhead system?*

The group will probably need to listen to the recording twice. Conduct open-class feedback and write the correct answers on the board.

Answers:

- 1) Typical DC voltages are 0.6 kV, 0.75 kV, 1.5 kV, 3 kV.
- 2) Typical AC voltages are 11 kV, 15 kV, 16 kV, 22 kV and 25 kV.
- 3) 50 Hz
- 4) When one power line breaks down, the substation is still receiving power from the other.
- 5) It consists of railway tracks and electrical connections.
- 6) They are: contact wire, catenary wire, droppers and power cables.

Tapescript

The power-supply system for overhead contact systems enables the operation of electric vehicles. Every system has the following parameters: current type, frequency (in the case of alternating current) and voltage. The overhead lines are usually supplied with direct current and single phase alternating current. Typical DC voltages are 0.6 kV, 0.75 kV, 1.5 kV, 3 kV. Typical AC voltages are 11 kV, 15 kV, 16 kV, 22 kV and 25 kV. The typical AC frequency is 50 Hz. The current is transformed in transformer-rectifier units. It is then distributed and forwarded to the network. A single traction substation is always supplied by two independent power lines. When one power line breaks down, the substation is still receiving power from the other.

The traction power network consists of the overhead contact system, which

supplies energy to the vehicle through power collectors (pantographs), and the traction return system. The return system consists of railway tracks and electrical connections. Overhead contact systems can be powered from the national power grid. After activation, the compact coils generate electromagnetic forces developed by the alternating magnetic field. It is necessary to use a voltage-reducing transformer. Rectifiers are also used. They make it possible to change AC voltage into the DC voltage necessary to supply the motors.

The overhead wires transfer energy to the electric vehicles travelling beneath them. The overhead wires are powered with current of industrial frequency. As a result, no traction substations are required. The overhead system has the following components: contact wire, catenary wire, droppers and power cables.

Exercise 5

This is a TRUE/FALSE type of exercise. Ask the students to read the statements. If there are any doubts concerning the vocabulary, give them some explanation/synonym. Ask the students to check their answers in pairs. Then, go through the answers with the whole group, conducting open-class feedback.

Answers:

1. F 2. F 3. T 4. F 5. T 6. T 7. T 8. F

SCREEN 7

Exercise 6

Lexis

The task practises some key vocabulary from the current and previous lessons. The students are to guess the words. Encourage them to work individually. After a few minutes ask volunteers to read out the correct answers.

Answers/Hints:

1. Traction power network

The overhead contact system is a component of it.

Hint: Allows electric vehicles to operate.

2. Rectifiers

They convert AC voltage to DC voltage.

Hint: Motors are powered by DC voltage.

3. Traction vehicle

A railway vehicle equipped with its own drive.

Hint: This can be a locomotive.

4. Power line

A device designed to transmit electric power.

Hint: Overhead lines are the most widely used type of electric power lines.

5. Pantograph

In other words, a power collector.

Hint: Used to provide power.

6. Return system

In other words, the tracks.

Hint: A component of the traction power network.

7. Railway track

Two rails supporting the wheels of rail vehicles.

Hint: It rests on a railway bed.

8. Transformer

Makes it possible to change the voltage in a high-voltage network.

Hint: Together with a rectifier, it forms a transforming unit.

GAME – SHOOTING

The students should quickly answer the questions, speed is the key to success. For each point, they have to choose correct items from a list. Divide the class into two teams. Prepare two table lamps. Read the questions one by one and the team which knows the answer must switch on the light before "shooting" the option/options. If they forget about the lamp, they do not get a point, the other team has a chance to get one. The team with the higher score wins.

Answers:

1. The components of the traction power network are:
overhead contact system, return system
computer network

2. The railway infrastructure includes:
tracks, platforms, tunnels

3. A mechanical installation enabling trains to be guided from one railway track to another is:
turnout
embankment, bridge

4. The component of the track that consists of two moveable and two fixed rails is:

switch

light meter, tram

5. High-speed lines are lines with a maximum allowable speed above:

200 km/h

450 km/h, 150 km/h

6. The catenary masts support:

overhead wires

crossing gates, semaphores

7. Makes it possible to turn off the power supply in a given section of the network:

lightning arresters, guides, switches

8. Rail traffic control devices are:

semaphores, crossing gates, turnouts

SCREEN 9

Exercise 7

Lexis

The students have to select the components that make up the traction power network from a list of 8 points. The students can do it in pairs or individually. Open-class feedback.

Answers:

1. Water tower
2. **Overhead line system**
3. **Tracks**
4. **Overhead wires**
5. **Electrical substation**
6. **3 kV DC switch room**
7. Compartment of a passenger car
8. Commercial premises of the station tunnel.

Feedback:

1. (1) It is a building that provides stable pressure in the waterworks.
2. (7) This component does not provide energy to the vehicle, but it does enable comfortable passenger travel.
3. (8) These are commercial premises not related to the supply of electricity to rail vehicles.

SCREEN 10

Exercise 8

Lexis

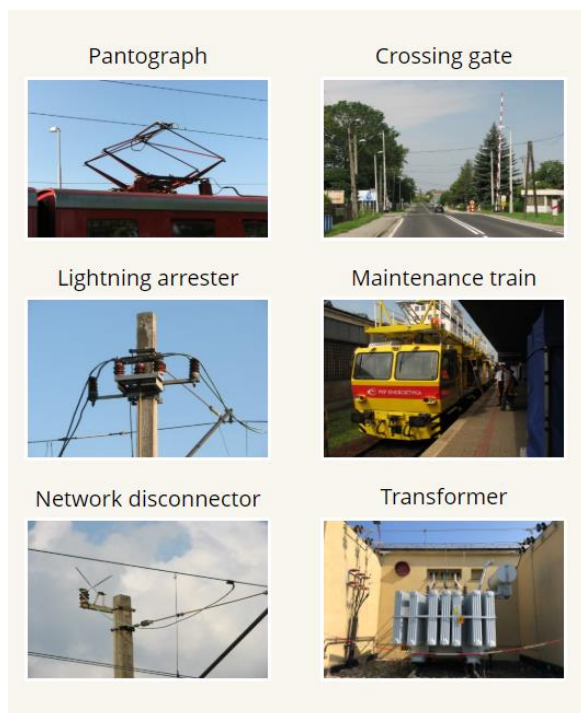
The students must label the pictures. They should drag the words from the source list to the appropriate pictures. Choose the students to check the answers.

Answers:

1. Pantograph
2. Lightning arrester
3. Network disconnecter
4. Crossing gate
5. Maintenance train
6. Transformer

Feedback:

1. Discharges the power supply.
2. Protects electrical devices against voltage surges.
3. Creates a safe isolation gap in the electrical circuit.
4. A barrier which stops road traffic at a level crossing.
5. A type of rail vehicle moving along the traction power network.
6. It is used to reduce the voltage.



SCREEN 11

Reading comprehension

Lead-in

Tell the class that they are going to read a text entitled: "Contact wire suspension height". Ask them what they already know about some regulations concerning height of contact line suspension. Ask them a few questions such as:

Why is it crucial to observe these regulations?

Do you know the English expression for PKP (Polskie Koleje Państwowe)?

Reading (1)

Ask the students to read the text and find out if any of their guesses were correct. Open-class feedback.

SCREEN 12

Reading (2)

Exercise 9

The students have to read the sentences and select the right word - text selection. Clarify any doubts as to the meaning. After a few minutes ask 8 different students to read one sentence each.

Answers:

1. The **simple catenary** / *trolley wire* system is a commonly-used solution on the lines operated by Polish Railways.
2. Two **contact** / *mud* wires are used on the mainline tracks and the through routes.
3. The minimum / **maximum** height of the cable suspension is 6,100 mm.
4. The contact wire height is measured from **railhead** / *traction power network*.
5. The raised **collector** / *semaphore* presses on the line with appropriate force.
6. The minimum height of the wire suspension depends on the minimum allowable distance between live wires and *the collector* / **rolling stock**.
7. The maximum height of the *national* / **international** rolling stock is 4,700 mm.
8. On **siding tracks** / *mainline tracks*, one contact wire and one catenary wire is used.

Feedback:

1. It is made of a contact wire suspended on a catenary wire by means of special cables called droppers.
2. Electric line suspended above the railway track.
3. The greatest possible height.
4. A steel beam, which is a part of one of two lines forming railway tracks.
5. Provides the power supply.
6. All means of transport.
7. Rolling stock travelling a route that runs through several countries.
8. The same components are used in loop lines (passing loops).

Check the Polish meaning of some vocabulary items from the written document (the students should be able to understand their meaning from the context), e.g.

vertical suspension system (pionowy układ zawieszenia)

running tracks (tory szlakowe)

loop lines (tory główne dodatkowe)

catenary wires (liny nośne)

collector (odbierak)

live wires (przewody pod napięciem)

rolling stock (tabor)

DOCUMENT

Title "Contact wire suspension height"

A catenary wire system with a vertical suspension system is often used on the lines operated by Polish State Railways (*Polskie Koleje Państwowe*). On **running tracks** and main lines, two contact wires and one or two **catenary wires** are used. On **loop lines** and sidings, one contact wire and one catenary wire is used. The reason is that vehicles are moving at slower speed on these tracks. The maximum contact wire suspension height is 6,100 mm. The height is measured from the railhead. The height is determined by the height of the raised **collector**, which must contact the **line** with appropriate force. It may be necessary to use the maximum height to meet some of the technical conditions of the railway infrastructure components, such as loading tracks or engine shed tracks. The minimum height of wire suspension depends on the minimum allowable gap between the **live wires** and **the rolling stock**, which is 200 mm. Polish State Railways adopted 4,650 mm as the maximum height of the rolling stock in Poland. For international rolling stock travelling on the tracks of Polish Railways, the height is 4,700 mm. Therefore, the height of the contact wire suspension must be at least 4,900 mm.

Post reading – note taking

Instructions for the class:

Basing on the text, write what the given height/gap stands for:

- 1) 6,100 mm -
- 2) 200 mm -
- 3) 4,650 mm -
- 4) 4,700 mm –
- 5) 4,900 mm –

Answers:

- 1) The maximum contact wire suspension height
- 2) The minimum allowable gap between the live wires and the rolling stock
- 3) The maximum height of the rolling stock in Poland
- 4) The height for international rolling stock travelling on the tracks of PKP (Polish State Railways)
- 5) The minimum height of the contact wire suspension

Extra idea – VOCABULARY - WORD FAMILIES

It might be interesting to focus on the words SUSPENSION and HEIGHT.

Ask the class to identify which part of speech they belong to. – They are NOUNS.

Remind the students that one useful way of learning vocabulary is making word families (in the form of charts, for example) and using words in sentences to better remember them.

Together with the class write 2 word families on the board:

SUSPENSION – noun

SUSPEND – verb

SUSPENDED – adjective

HEIGHT – noun

HEIGHTEN – verb

HIGH – adjective

HIGHLY – adverb

For homework the students have to write sentences with all the words paying attention to the fact that they can have different meaning depending on the context, e.g.

suspend = 1) temporarily prevent from continuing or being in force or effect (wstrzymać, np. prace, zawiesić kogoś w wykonywaniu obowiązków, etc)

2) hang (something) from somewhere (zawiesić coś, np. żyrandol na suficie)

SCREEN 13

Exercise 10

The students are asked to match the words which rhyme. Open-class feedback.

Answers:

1. track - chuck
2. wire - liar
3. height - right
4. raize - maize
5. loop - group
6. rail - male
7. high - wi-fi
8. speed - lead

Feedback:

1. It also rhymes with 'pack'.
2. It also rhymes with 'fire'.
3. It also rhymes with 'write'.

4. It also rhymes with 'glaze'.
5. It also rhymes with 'troop'.
6. It also rhymes with 'mail'.
7. It also rhymes with 'my'.
8. It also rhymes with 'greed'.

SCREEN 14

Exercise 11

Lexis

Working in pairs the students are to combine the expression with the definition. Open-class feedback.

Answers:

1. Maintenance train	A. Used for the repair and maintenance of the traction power network infrastructure.
2. Contact wire	B. Conductor of the overhead contact system suspended above the track.
3. Traction substation	C. Grid station providing power to the traction power network.
4. Auxiliary wire	D. Used to increase the cross-section of the traction power network when the conductivity of the overhead line system is insufficient.
5. Catenary wire	E. A line supporting the contact wires.
6. National rolling stock	F. A train that runs within one country.
7. Voltage rectifier	G. Used to convert AC voltage into voltage that can later be converted to DC voltage.
8. Power source	H. A device that supplies electricity to power other electrical devices.

Feedback:

1. A kind of specialist repair machine.
2. Its cross-section resembles the number 8.

3. Due to the power supply system operated in Poland, they are transformer-rectifier units.
4. They are no longer used in newly built traction power networks.
5. It is most often made of copper.
6. It does not cross the border of a given territory.
7. Used in most electronic devices powered by the power grid or any other alternating voltage supply.
8. They can also be power supplies acting as grid current converters.

SCREEN 15

Exercise 12

Lexis

Inform the students that their task is to place the phrases under the correct categories. Open-class feedback.

Answers:

The trackside power supply system provides electricity to: stations, semaphores, crossing gates, turnouts

Types of tracks: sidings, loop lines, running tracks, main lines

Feedback:

1. These components must be powered by electricity.
2. They consist of two rails supporting and guiding the wheels of rail vehicles.

Extra idea – SMALL TALK (grammar and speaking)

The students should be familiar with specialist terminology connected with their profession and feel confident while discussing job-related issues. However, human interaction also involves less formal situations, thus the students will often have to talk about everyday matters. The concept of SMALL TALK is really useful.

Grammar points to be revised (elicit needed information from the class and provide some examples on the board):

Present Continuous

We can use it to talk about the weather, ongoing activities, fixed arrangements for the near future, sample sentence:

It is snowing heavily today.

Present Simple (used to talk about your daily routine, hobbies, preferences, regular activities), e.g.

I sometimes play football at the weekend.

Present Perfect (something happened in the past but it does not matter when, the result is important, used to talk about experience), e.g.:

Have you seen the new Hollywood production?

Past Simple (something happened in the past, a finished action), sample sentence:

I had a wonderful holiday last year.

Future Simple (predictions about the future, hopes, dreams, spontaneous decisions), e.g.

I hope my favourite band will have a concert in Poland soon.

To be going to + verb (intentions, plans for the future), sample sentence:

I am going to visit this new restaurant this weekend.

Suggested instructions:

Tell the students that it is necessary to be able to make small talk – this conversation does not deal with any personal details, religion, politics, etc. Its main aim is to break the ice and socialise. Divide the class into groups of 3-4 students and ask them to practise small talk.

Distribute copies with useful topics for conversation such as:

THE WEATHER

FAVOURITE FOOD/CUISINE/MUSIC

PETS

SPORTS (Do you practise/watch any sports? How often?, etc)

BOOKS/MAGAZINES/FILMS (Are you reading anything interesting now? What is the best book you have ever read/film you can recommend?)

LAST HOLIDAYS/TRIP/BIRTHDAY

PLANS FOR THE WEEKEND/HOLIDAYS

THE INTERNET/SOCIAL MEDIA

CURRENT NEWS

ENTERTAINMENT

Monitor the students and provide some tips, encourage them to show some interest in what other people are saying by positive reactions, asking additional questions, sharing their own opinions, etc. After 10 minutes ask some people to share a few interesting facts they have learnt about their classmates with the whole group.

SCREEN 16

LESSON REPORT

LESSON NOTES

Professional area: electrics and electronics

Professional group: electrics, electronics and energy engineering

Business: railway infrastructure management

Profession: railway power engineering technician

Qualification symbol: EE.27.2.

Module: Installation and operation of traction power network

EE.27.2. Installation and operation of traction power network

SCREEN 1

Cover Page

SCREEN 2

Video

Lead-in

The students are going to watch and listen to a video entitled “*Construction of power network*”. Before that lead a short open-class discussion and give the students some interesting facts. Ask them some questions like:

How has electricity changed our lives?

(hints: lighting, refrigeration and air conditioning, household appliances, modern technology – computers, the internet, cell phones, etc)

How has electricity changed rail travel?

(There are significant cuts in carbon emissions, electric trains have lower energy and maintenance costs, we can enjoy faster and quieter journeys).

What do you know about the first electric locomotive and the first electric passenger train? Can you guess the dates/places/names of the constructors?

<The first known electric locomotive was built in 1837 by chemist Robert Davidson of Aberdeen, and it was powered by galvanic cells (batteries). The first electric passenger train was presented by Werner von Siemens at Berlin in 1879.>

Which country in the world has the longest electric traction?

(In 2012 for electrified kilometres, China surpassed Russia making it first place in the world with over 48,000 km electrified. Trailing behind China were Russia 43,300 km, India 30,012 km, Germany 21,000 km, Japan 17,000 km, and France 15,200 km).

Listening for gist

The students have to watch the episode and try to find the answers to some general questions (you should write them on the board) such as:

Why did Alice and Rob meet in the design office?

Is the project going to be very difficult? Why?/Why not?

Does Robert remember what the required traction height is?

Before playing the video revise/check/pre-teach some key vocabulary items, e.g.:

overhead (adj) = (of a driving mechanism) above the object driven

major (adj) = important, serious, or significant

entire (adj) = with no part left out; whole

technical requirements (noun phrase) = the technical aspects that your system must fulfill, such as performance-related issues, reliability issues, and availability issues

ensure (v) = make certain that (something) will occur or be the case

proper (adj) = real, satisfactory, suitable, or correct

contact wire, catenary wire – if the students do not know/remember the terms – refer them to the glossary available at the end of the module

compatibility (n) = a state in which two things are able to exist or occur together without problems or conflict

regardless of sth (idiom) = without being influenced by any other events or conditions

quantity (n) = the amount or number of something, especially that can be measured

take into account (idiom) = to consider or remember something when judging a situation

appropriate (adj) = suitable or right for a particular situation or occasion

flexibility (n) = the quality of bending easily without breaking

pantograph (n) = a jointed framework conveying a current to a train, tram, or other electric vehicle from overhead wires

draft (v) = prepare a preliminary version of (a document)

Let the students compare the answers with each other. Conduct open-class feedback and check the answers to the questions written on the board.

Listening for specific information

Exercise 1 (T/F)

Before the students watch or just listen to the episode, ask them to read Task 2 and decide which statements are TRUE and which ones are FALSE. Explain any problematic vocabulary items. Afterwards check the answers and have the students explain why they have decided on a T or F option. Open-class feedback.

Answers:

1. T 2. F 3. T 4. T 5. T 6. F 7. F 8. F

SCREEN 3

Listening for detail

Exercise 2 – multiple choice

Inform the class that the second time they watch the video, they will have to focus on some more specific aspects. Make them read Task 1 – all the statements and the options (a, b, c). Deal with any problems connected with understanding. The students must choose the correct answers. Play the video. The students compare their answers with their partners before open-class feedback.

Answers/Feedback:

1. correct interaction of the collector with the contact wire when vehicles are gathering speed

F: It applies to the device transferring electric current from the wire to the electric locomotive.

2. traffic intensity

F: Average daily vehicle traffic.

3. 250 km/h

F: The overhead contact system needs to have uniform flexibility to develop this speed.

4. the catenary wire and the contact wires

F: Measured at the point of suspension.

5. traffic conditions

F: They include factors affecting driving behaviour and traffic flow.

6. a catenary wire that supports the contact wire with appropriate droppers

F: Connection between the copper connection and the vehicle-powering cable.

7. easier to build than the one for high speeds

F: The design does not have to be highly complex.

8. a traction power network

F: The project involves constructing a network of devices to supply power to electric vehicles.

Post listening – role playing and pronunciation

To practise the new language and its proper pronunciation you can make the class take a role of the man or the woman in the dialogue. Play the video and stop it every time when the man is going to say his lines. The students have to provide his utterance from memory, then you will play it to check. It can be fun for the group. If they enjoy this activity, you can play the video once more, this time they will have to take on the woman's role. Monitor and pay attention to pronunciation. In case of problems, drill the difficult vocabulary items (*e.g. major, entire, requirements, ensure, vehicles, etc*).

Remember to follow the pattern:

1. THE TEACHER MODELS THE TARGET LANGUAGE THREE TIMES

2. THE STUDENTS REPEAT CHORALLY

3. THE STUDENTS REPEAT CHORALLY AGAIN

4. THE TEACHER HIGHLIGHTS KEY ASPECTS OF THE TARGET LANGUAGE

5. THE STUDENTS REPEAT CHORALLY

6. THE TEACHER NOMINATES INDIVIDUAL STUDENTS TO REPEAT INDIVIDUALLY WITH CORRECTION AS APPROPRIATE

7. THE STUDENTS REPEAT CHORALLY TO FINISH

Tapescript

Title: “Construction of power network”

R: Hi, Alice. We’ve got a new order to design an overhead contact line.

A: Hey, Rob. That’s good news and a major challenge ahead of us. The structure of the entire OCL (overhead contact line) depends on the traffic conditions.

R: It all depends on how fast the rail vehicles move. Fortunately, the construction for lower speeds doesn’t have to be as complicated as for higher speeds.

A: Hm... what are the technical requirements?

R: The most important thing is to ensure proper interaction with the contact wire in relation to speed development of the moving vehicles.

A: From minimum to maximum.

R: We also need to ensure compatibility of operation regardless of the season and weather conditions.

A: ...as well as transmission of electricity in quantities adequate to the intensity of traffic on a given railway line.

R: Did you take into account the contact wires?

A: Of course.

R: In this case constructing an overhead contact line will probably be the wisest option. It will consist of a catenary wire supporting the contact wire with appropriate hangers.

A: You mean a single catenary line?

R: Yes. If the vehicles are to develop speed of up to 250 km/h, we need to construct an OCT with two contact wires, automatic tension regulation and even flexibility.

A: By using two contact wires, we will increase the contact surface of the pantograph head with the net.

A: Do you remember what the required traction height is?

R: I need to look at the regulations, but the traction network should be measured at the suspension point and it is the distance between the catenary wire and the contact wires.

A: All right, in that case let’s get to it and start drafting and calculating.

R: Ready when you are!

SCREEN 4

Instructional video

Lead-in

The students are going to watch an instructional video entitled “*Structural components of traction power network*”. Ask them what they know about this topic.

Sample questions:

What do we need to build a traction power network?

Can you explain the function of some elements used for constructing it?

What materials are used to produce such elements?

Listening for detail (1)

The questions for the class to be written on the board, e.g.:

- 1) *What do we need support structures for?*
- 2) *Name 3 kinds of wires used in an OCL.*
- 3) *What is the function of insulators?*
- 4) *What do we use to connect different parts? (3 ideas)*

Play the video and check the answers – open-class feedback.

Answers:

- 1) To suspend an overhead contact line.
- 2) Catenary wires, auxiliary wires, contact wires.
- 3) They make two electrically live sections separate.
- 4) Bolts, clamps, hook bolts.

Listening for detail (2)

Exercise 3

Explain Task 3 – the students are to complete the sentences using the words/phrases from the source list. Make them read the statements and try to complete the gaps before watching the video again. Then play it for them to check. Choose individual students to read out the completed sentences.

Answers:

1. supporting
2. masts
3. gantries
4. Catenary wires
5. electric current
6. Insulators
7. traction
8. cantilevers

Feedback:

1. Elements adapted to the routing of overhead wires.
2. Supports contact wires over the tracks.

3. An element consisting of two masts connected at the top with a crossbar.
4. Contact wires are attached to them.
5. Electricity.
6. A device used for simultaneously connecting and disconnecting components under voltage.
7. A network adapted to the traffic of rail vehicles.
8. Masts with these two elements are used to support complex suspension systems.

Post listening task – enriching vocabulary and speaking

It is worth concentrating on some specific vocabulary such as materials used in construction, electrics and engineering. First, brainstorm some words – ask the students to work in pairs and make a list of materials most commonly used.

A proposed list:

concrete

reinforced concrete (żelbeton)

steel

timber (drewno)

stone

cast iron (żeliwo)

plastic composite

copper (miedź)

glass

porcelaine

silicone

Next the students can describe the images from the instructional video talking about the materials used to make them.

Tapescript

Title: “Structural components of traction power network”

Support structures include the components from which an overhead contact line (OCL) is suspended. Today, both single or multiple catenaries are used. A single catenary is mounted on reinforced or steel masts. To support multiple catenary structure steel portal frames, cantilever masts with a two-track span or twin cantilever masts are installed.

According to their functions we may divide the wires used in an OCL into the following kinds:

- catenary wires, that is wires which are used to transfer mechanical energy but which do not conduct electric current,
- auxiliary wires, which transfer mechanical energy and also conduct electric current,
- contact wires (also called trolley wires) which only conduct electric current and are only subjected to the load of their dead weight.

The purpose of the insulators is to make two electrically live sections separate so that the electric potential of one section is not present in the other. As part of an OCL, insulators have to operate under difficult conditions. Their job is to insulate the OCL from the support structure, to separate the OCLs of neighbouring tracks located on the same structures and to separate adjacent sections suspended above the same track.

Installation equipment is used to connect wires to one another, to attach cantilevers to support structures and to suspend wires. Depending on the role it is supposed to play, various solutions are applied, e.g. to transfer mechanical energy, insulate or conduct electric current etc. Bolts are most frequently used to connect components, whereas clamps and hook bolts - for connecting cantilevers to the support structure.

Exercise 4

The students are asked to choose the synonym of the expression given. [dropdown] Encourage the class to work in pairs. Open-class feedback.

Answers:

1. luckily - **fortunately**/regrettably
2. Thank you very much. - **I feel very grateful**./I feel very appreciated.
3. the most important thing - **the crucial matter**/an utterly redundant aspect
4. Hi! - **Hello!**/See you!
5. apart from that - **in addition to**/even though
6. a very difficult task - **a major challenge**/a piece of cake
7. in spite of - **although**/in case
8. between 1985 and 1991 - **from 1985 to 1991**/before 1985 and after 1991

Extra idea

Ask the students to make some sentences using all the options – both the chosen synonyms and the remaining phrases. It can be set for homework.

SCREEN 5

Lead-in

The students will listen to the recording entitled *“The history of traction power networks in Poland”*. To make students engaged in the topic, elicit the names of main types of locomotives. They should be able to come up with:

STEAM LOCOMOTIVE

DIESEL LOCOMOTIVE

ELECTRIC LOCOMOTIVE

MAGLEV LOCOMOTIVE

Divide the class into 3 teams, each team will have to list a few pluses and minuses of one type of locomotives. Encourage them to use the internet resources on the computer or smartphones. Give the students a few minutes before you ask each team’s representative to present their ideas.

Team 1 – steam locomotives

Team 2 – diesel locomotives

Team 3 – electric locomotives

Possible answers:

STEAM LOCOMOTIVE

ADVANTAGES: anything that burns can be used as the fuel, longer life, etc

DISADVANTAGES: huge and heavy, it takes time to start it, unsafe to use, low efficiency, etc

DIESEL LOCOMOTIVE

ADVANTAGES: more efficient than steam locomotives, can be put into operation immediately, low initial cost as no track electrification is needed, etc

DISADVANTAGES: pollution of the environment, its running cost is high, complex engine design therefore maintenance is difficult, etc

ELECTRIC LOCOMOTIVES

ADVANTAGES: lighter than diesel trains, more environmentally friendly, shorter journey times, more cost effective, etc

DISADVANTAGES: huge initial infrastructure cost, possible power failures, etc

Listening (1)

Ask the students to listen carefully to the narration and try to remember as much information as they can, they may take some notes. Open-class feedback.

Listening (2)

Exercise 5

Less advanced groups may have problems with some vocabulary items which are used in the recording.

Explain/revise/pre-teach some words, e.g.:

determine (v) = to control or influence something directly, or to decide what will happen

overcurrent (n) = an electrical current whose intensity is higher than a specified amount

drop (n) = a decline in quantity or quality

outbreak (n) = a sudden occurrence of something unwelcome, such as war or disease

state-of-the-art (adj) = very modern and using the most recent ideas and methods

in conjunction with = together

converter (n) = a device for altering the nature of an electric current or signal

Exercise 5

The students should read the 8 statements and choose the correct answers from the given options before listening to the narration. Explain any difficult points so that everybody understands everything. After you play the recording, the students can check their answers with other classmates. Open-class feedback.

Answers:

1. power
2. 3 kV
3. traction power network
4. DC
5. suburban
6. electrified
7. locomotive
8. induction

Feedback:

1. It is a system for vehicles powered by a motor that uses electricity, which it converts into mechanical energy.
2. In this system, the insulation used in the motor means that low voltage must be used.
3. It comprises the overhead contract system and the return system.
4. Its advantage is the ability to power devices containing electronic systems directly from portable energy sources, such as batteries.
5. The areas located around the city.
6. In other words, the spread of electricity.
7. A rail vehicle pulling train carriages.
8. Used in industry and in home appliances.

Extra idea

Listening for detail (3)

The students will have to listen for specific information. Put the following sentences on the board:

- I. A 3 kV DC system is characterized by:
 - 1)
 - 2)
 - 3)
- II. The disadvantages of the system include:
 - 1)
 - 2)
 - 3)
 - 4)

The students will hear the recording again and they have to complete the sentences written on the board. Let them compare their answers before checking them with the whole class.

Answers:

- I.
 - 1) simple design and low operating costs for locomotives
 - 2) a simple traction power-network design
 - 3) motor insulation, which dictates the use of low voltage
- II.
 - 1) overcurrent incidents
 - 2) high voltage drops
 - 3) a large number of supply-network substations
 - 4) large wire system cross-sections

Tapescript

“The history of traction power networks in Poland”

The traction power network determines the construction of the contact system, the electrical equipment for traction vehicles and the electric heating devices installed in passenger carriages. In Poland, a 3 kV DC system is used, which has:

- simple design and low operating costs for locomotives;
- a simple traction power-network design;
- motor insulation, which dictates the use of low voltage.

Easy-to-build locomotives are the system's biggest advantage. Its key disadvantages are:

- overcurrent incidents;
- high voltage drops;

- a large number of supply-network substations;
- large wire system cross-sections.

In Poland, traction power network was used for the first time before the outbreak of World War II. At that time the electrification of suburban traffic at the Warsaw railway junction was only being finalised. Approximately 106 km of double-track lines on the Warsaw-Mińsk Mazowiecki-Żyrardów-Otwock section were electrified. Over 20,000 km of the now existing 26,000 km of railway lines have now been electrified.

Production of carriages, electric locomotives, multiple units and trams began in 1990. The Electric Locomotive Repair Plant in Gliwice undertook the task of designing a state-of-the-art 5MW locomotive. The company began working with KOMEL, a research and development centre for electric machines, which developed an induction motor of 830 kW. The locomotive is powered by six electric engines manufactured by EMIT S.A. which, in conjunction with the Warsaw Electrotechnical Institute, developed converters, control and diagnostics systems, and a static converter required to power drives and auxiliary circuits, for the engines.

SCREEN 6

Exercise 6

LEXIS

The students must guess the words/phrases. There are definitions of the words provided to make it an easier activity.

Answers/Hints:

1. Constant current

Type of unidirectional electric current with constant amperage.

H: In Poland, the traction power system used is the one with this 3 kV element.

2. Static converter

Used in a railway vehicle to convert direct traction voltage.

H: Required to power drives and auxiliary circuits.

3. Passenger carriage

A non-traction vehicle designed to carry passengers.

H: They can be compartment-style or open-saloon style.

4. Diagnostics

Determining the technical condition of devices and possible causes of malfunctions.

H: If regularly performed, it makes it possible to find defects that could lead to the breakdown of the machine.

5. Locomotive

A type of rail vehicle that is used to pull wagons.

H: It was built by the Repair Department of Electric Locomotives in Gliwice and had a power of 5mW.

6. Power

Power supply to electrical devices.

H: Transmitted by a traction substation.

7. Electrification

Supplying an area or building with electricity.

H: Before the outbreak of World War II, it was available only for suburban traffic at the Warsaw railway junction.

8. Induction motor

An AC motor, of which only one part is connected to the mains.

H: The 830 kW unit was created by KOMEL, a research and development centre for electric machines.

SCREEN 7

Reading

STAGE 1 – putting paragraphs in the right order

The students will probably be quite familiar with the basis of constructing a traction power network. Therefore you can print the document, cut it into 5 paragraphs, and ask pairs of students to order them to get a logical text. After a few minutes check the answers with the class.

Construction of a traction power network

Electrification of a line means constructing facilities to provide the necessary supply of electricity. First, **traction substations** are installed. Then a building connected to the electric lines is constructed. Next, an overhead contact system is built. The places where the supporting structures are built are marked, holes are drilled for catenary masts and, before being bolted down to the foundations, the masts are numbered and installed in the holes.

The next stage is the installation of the **contact wires**. There are two methods of suspending the contact line. The first involves installing suspension structures to attach the contact wire to. Tubes are used to stiffen the auxiliary cantilevers. Moveable rollers are fixed to the cantilevers. Then the catenary wire and the contact wires are installed. If the system consists of two contact wires, they are suspended simultaneously, but uncoiled from two different drums. Then, the device is mounted to the anchors and the auxiliary equipment is removed. Auxiliary cantilevers, guy arms, droppers and distance brackets are installed at the network-hanging stage. The system is fixed to the central

anchors. The catenary wires are removed from the rollers and cantilevers. The final phase is the assembly of section insulators, electrical connections, lightning arresters and section disconnectors.

The second method is to lay the catenary wire between isolated **rail sections**. The tensioned catenary wire is erected and fixed to cantilevers. The remaining works are the same as in the first method. When the network is finished, individual and group rail-ground cables are fixed to the rails. Individual rail ground cables are connected to the rails by screw terminals or welding and group ground cables are connected to each other and buried in the ground. Insulation is used if there is a risk the cable may come into contact with the ground.

When work on the overhead contact line is complete, trackside power supply is installed. Crossbars are installed and line wires are suspended at the tops of traction masts.

Before the investment is commissioned, acceptance tests are carried out to check the compliance of the workmanship with technical documentation, the quality of the components installed, insulation distances, the resistance of electrical connections, and the interaction between the collector and the power network. After verification, a voltage test is performed. Its duration and scope of measurements depend on the length of the electrified section. Tests are carried out by representatives of the operating crew, and by the contractor and investor.

SCREEN 8

STAGE 2

Exercise 7

The students should read the document carefully and arrange the diagram of a traction power network construction in the correct order. Open-class feedback.

Answers:

construction of a traction substation → establishing locations for supporting structures → erecting catenary masts → installing the overhead contact system → fixing the rail-ground cables → installing the insulators → acceptance tests → putting the system into operation

Post-reading – dealing with new vocabulary

The students are asked to underline all new words in the document, then tell them to try to guess their meaning from the context of the sentence and the whole paragraph. They can rely on their professional knowledge as well.

Produce a list of the words on the board and elicit the explanation from the class, as a group they will be able to work out the meaning of most problematic items.

Possible list of words and phrases:

facility = zaplecze

drill a hole = wywiercić otwór

bolt down to the foundations = przykręcać do fundamentów

suspend = zawieszać

attach = mocować

tubes stiffen the auxiliary overhangs = korytka usztywniają wysięgi pomocnicze

movable rollers = rolki ruchome

simultaneously = równocześnie

uncoil = rozwijać

drums = bębny

anchors = kotwy

guy arms = ramiona odciągowe

droppers = wieszaki

distance brackets = uchwyty odległościowe

assembly = montaż

lightning arresters = odgromniki

section disconnectors = odłączniki sekcyjne

tensioned = naprężona

welding = spawanie

bury in ground – zakopać w ziemi

crossbars = poprzeczniki

before the investment is commissioned = przed oddaniem inwestycji do eksploatacji

acceptance tests = próby odbiorcze

compliance of the workmanship with = zgodność wykonania z

duration and scope of measurements = czas i pomiary

operating crew = służba eksploatacyjna

Pronunciation practice

Drill the pronunciation of difficult items or even the whole list from the board.

Remember to follow the pattern:

1. THE TEACHER MODELS THE TARGET LANGUAGE THREE TIMES
2. THE STUDENTS REPEAT CHORALLY
3. THE STUDENTS REPEAT CHORALLY AGAIN
4. THE TEACHER HIGHLIGHTS KEY ASPECTS OF THE TARGET LANGUAGE
5. THE STUDENTS REPEAT CHORALLY

6. THE TEACHER NOMINATES INDIVIDUAL STUDENTS TO REPEAT INDIVIDUALLY WITH CORRECTION AS APPROPRIATE
7. THE STUDENTS REPEAT CHORALLY TO FINISH

SPEAKING ACTIVITY

To practise the new language you can ask the class to read the document again and focus on the content as they are going to talk about construction of a traction power network from memory, just looking at the list of words/expressions on the board. After a few minutes ask the first student to start describing the process, then ask the next one to continue and so on. Monitor and support the students, if they get stuck, give them a clue to help them.

Extra idea

There are a few grammar aspects you may wish to explore, such as:

The passive voice, conditional type O, different aspects of -ing forms of verbs (used as a noun, an adjective, gerund after prepositions, present participle, etc).

If you decide to follow up with exploring some useful language, bear in mind the following steps:

- present the target language in context and co-text to enhance understanding
- students notice/ focus on the target language
- deal with its meaning and use
- deal with its form, highlight it
- provide a controlled practice task to check if students got to grips with both its meaning and form
- provide some thorough pronunciation practice, highlight the features of connected speech, prominence, word stress, intonation; drill the whole sentences; be energetic and make it fun; use a variety of drilling techniques (choral, individual, pair, disappearing, substitution drills)
- to put it all into practice, provide a freer-practice activity, mirroring real life situations, where students use the target language in a natural context in speaking or writing

SCREEN 9 GAME

The students have to match English names with their Polish equivalents to form the pairs.

Open-class feedback.

Answers:

1. Sieć jezdna - overhead contact system
2. Lina nośna - catenary wire
3. Linia energetyczna - power line
4. Słup trakcyjny - catenary mast
5. Trakcja elektryczna - traction power system
6. Szyny - rails
7. Śruby hakowe - open eye bolts
8. Podstacja trakcyjna - traction substation

SCREEN 10

Exercise 8

The students are to complete the gaps with the correct expressions from the source list. [draggable gaps] Open-class feedback.

Answers:

1. The construction for lower speeds doesn't have to be **as complicated** as for higher speeds.
2. The construction for lower speeds doesn't have to be **more complicated** than for higher speeds.
3. We **also** need to ensure the compatibility of operation regardless of the season and weather conditions.
4. We need to ensure the compatibility of operation regardless of the season and weather conditions, **as well**.
5. We need to ensure the compatibility of operation **regardless** of the season and weather conditions.
6. We need to ensure the compatibility of operation **no matter** the season and weather conditions.
7. The structure of the entire system **depends** on the traffic conditions.
8. The structure of the entire system **is determined** by the traffic conditions.

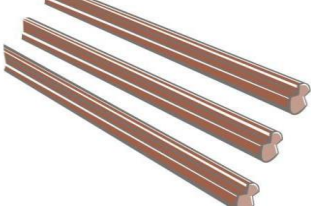
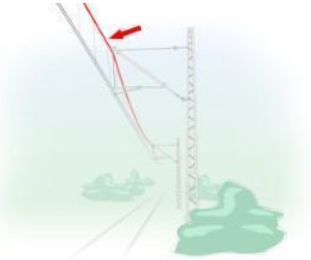
SCREEN 11

Exercise 9

Lexis

The students' task is to match the pictures with the correct terms. The students can work in pairs. Check the answers with the whole class.

Answers/Feedback:

Contact wire  Feedback: Its cross-section resembles the number 8.	Traction substation  Feedback: It supplies electrical energy to a traction power network on a specific section of a railway, trolleybus or tram line.	Catenary mast  Feedback: The structure that supports the overhead contact system above the track.
Rails  Feedback: Components of the tracks.	Open eye bolt  Feedback: A type of fastening and clamping element.	Catenary wire  Feedback: Contact wires and other elements of the traction network are attached to it.

SCREEN 12

Exercise 10

There are 8 sentences to read. The students must choose only true statements.
Open-class feedback.

Answers:

1. Construction of the traction power network starts with the installation of the catenary wires.

2. A contact system is a part of the traction power network.
3. Contact wires are attached to the catenary wire.
4. Acceptance testing is the last thing to do before putting the system into operation.
5. Electricity is transmitted from the traction substation to the grid through the power supply.
6. The overhead contact system is suspended on a supporting structure made of masts.
7. How long the acceptance tests take depends on the width of the electrified section.
8. Acceptance tests are done on the traction power network when it is in operation.

Feedback:

1. (1) The first stage of system construction involves traction substations.
2. (7) All measurements depend on the length of a given section.
3. (8) Checks are performed before the network is put into service.

SCREEN 13

Exercise 11

Lexis

The students are asked to group the words into two categories. After a few minutes check the answers with the class.

Answers:

Wires used in an overhead contact system: catenary wires, auxiliary wires, contact wires

Elements installed at the final stage of construction of the overhead contact system: section insulators, electric connections, lightning arresters, section disconnectors

Feedback:

1. Cords that conduct mechanical or electrical energy.
2. These elements are assembled after fixing the central anchors and removing the catenary wires from the rollers and cantilevers.

SCREEN 14

Exercise 12

Lexis

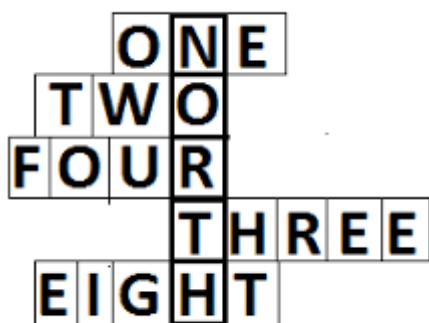
The students are asked to do the crossword puzzle. They can work in pairs or individually. Open-class feedback.

Answers:

Word	Clue
1. Electrification	The process of expanding an electric power grid.
2. Mast	A kind of pole that the contact wires are suspended from.
3. Insulators	Holders intended for insulating a traction network.
4. Clamps	Fittings used to clip wires together
5. Traction	A type of electrical power supply for rail vehicles.
6. line	A device designed to transfer electrical energy: power....
7. Train	Also called a railroad vehicle.
8. Anchor	Retaining element of a machine that blocks its movement or rotation.

EXTRA IDEA – CREATING YOUR OWN CROSSWORD PUZZLE

To practise the new vocabulary items and grammar (using the passive, the present simple for instructions and definitions, etc) the students are asked to prepare their own crossword consisting of about 10 clues. It must contain a vertical password, like in the example you draw on the board:



The students are asked to use the new vocabulary included in the module (technical terms, new verbs, phrases) and write clear definitions/clues, e.g.:

It is a metal element you need to fasten things together. (BOLT)

Another word for the verb “supply”. (PROVIDE)

A person whose job is to work on a particular project for a particular amount of money. (CONTRACTOR)

In the first stage of constructing a traction power network you must build a (TRACTION SUBSTATION)

Kind of wires. (CATENARY), etc

Monitor the students’ work and offer help. After 10-15 minutes some of the students can present their crosswords on the board – draw them and read out the clues for the class to guess. You can copy the other crosswords and give them to the group to be solved for homework.

SCREEN 15

Report

LESSON NOTES

Professional area: electrics and electronics

Professional group: electrics, electronics and energy engineering

Business: railway infrastructure management

Profession: Railway power engineering technician

Qualification symbol: EE.28.1.

Module: Assembly of railway vehicles

EE.28.1. Assembly of railway vehicles

SCREEN 1

Cover Page

SCREEN 2

Dialogue Video

Lead-in

Tell the class that they are going to watch a video with two conductors (a middle-aged man and a young woman) leading a conversation just before they start their shift. Encourage the students to guess what the topic of the conversation might be.

Listening for gist

The students will watch and listen to the episode. Ask them to focus on the questions you put on the board:

- 1) Is the man knowledgeable? Why do you think so?
- 2) What is the woman interested in?
- 3) Can you guess the title of this episode?

Answers:

- 1) Yes, definitely. He knows a lot about the production of trains and technology thanks to years of experience.
- 2) She wants to know some details connected with technological process.
- 3) Students' guesses.

Listening for specific information

Exercise 1

The students must read T/F sentences and decide on the right answers. Explain any difficult phrases if necessary. Before listening/watching make the class do the exercise, then they can check their answers while listening. Appoint individual students to read the answers with some explanation to justify their choice.

Depending on the level of your group it might be advisable to check/explain/pre-teach some vocabulary items, such as:

evolve (v) = develop gradually

rolling stock (n) = locomotives, carriages, wagons, or other vehicles used on a railway - TABOR

apply (v) = have a connection or be important

entire (adj) = whole or complete, with nothing missing

average (n) = a standard or level that is considered to be typical or usual

plant (n) = a place where an industrial or manufacturing process takes place

devote (v) = give all or most of one's time or resources to (a person or activity)
refine (v) = improve an idea, method, system, etc. by making small changes
assembly (n) = the process of putting together the parts of a machine or structure
assemble (v) = make something by joining separate parts
assembler (n-person) = a worker that puts together the parts of an object being manufactured - MONTAŻYSTA
insert (v) = put something inside something else
staff (n) = the group of people who work for an organization
welder (n) = a person who welds metal (joins pieces of metal together permanently by melting the parts that touch or joins one piece of metal to another in this way)
resemble (v) = be similar to someone or something
interior (n) = the inside part of something
carriage (n) = any of the separate sections of a train that carry passengers
bogie (n) = an undercarriage with four or six wheels pivoted beneath the end of a railway vehicle
house (v) = provide space for something
impact (n) = a powerful effect that something, especially something new, has on a situation or person
laminar (adj) = (of a flow) taking place along constant streamlines, without turbulence
air flow (noun phrase) = OPŁYW POWIETRZA
affect (v) = have an effect on; make a difference to

Answers:

1. F 2. F 3. T 4. T 5. T 6. F 7. T 8. F

SCREEN 3

Listening for detail

Exercise 2

The students should read the statements and options in Task 2. Encourage them to pick some answers they think might be correct. Deal with any problematic vocabulary items. Play the video and, afterwards, let the students compare and discuss their answers in pairs before conducting open-class feedback.

Answers (with feedback):

1. a. has been modernised.

Feedback: The railway has recently evolved a lot.

2. b. ca. 20 days

Feedback: Refining the train structure takes the same amount of time.

3. b. welders

Feedback: These workers connect all the metal parts of the train before the structure is sent to the assembly hall.

4. b. a metal structure

Feedback: Construction of a train starts with the frame. The other elements are then mounted on it.

5. a. the shape of the train

Feedback: The more aerodynamic the train is, the less drag it generates.

6. c. the destination

Feedback: This is something that the passengers choose themselves.

7. b. after fitting the interior of the train

Feedback: Bogies are attached at the very end of the process.

a. the bogie

Feedback: The engine is installed in it.

Tapescript

Title: Conversation on the platform

Woman: Have you noticed that our railway has recently evolved a lot? The entire rolling stock has been modernised.

Man: That's true, it's getting better. This applies not only to what we see, but also to the entire technological process.

Woman: Technological process?

Man: Yes, it's not just the trains that have been modernised, the whole production process has also been developing. Each train now spends an average of 40 days at the production plant. Half of this time is devoted to refining the construction. The assembly takes the other 20 days.

Woman: Wow, that must take a lot of people to do it!

Man: That's right. It requires qualified staff, welders, mostly... The production of such a train begins with making a steel construction, which doesn't much resemble the final shape of the train.

Woman: What happens next?

Man: Welders join all the metal parts and the train goes to the assembly hall, where the rest of the parts, both those completing the construction and the finishing ones, are inserted. The floor, walls, windows and doors are assembled and all the sensors and cabling are installed here.

Woman: You know a lot about it.

Man: Years of experience! What's more, the interior is matched to the needs of

travellers, for example, by dividing carriages into classes. At the very end, the entire construction is joined with bogies.

Woman: Bogies?

Man: Yes. The bogie is what the train travels on. It's probably the most important part of a train, because this is where the traction motor is housed.

Woman: That's really interesting. Does the shape of the train have any impact on its speed?

Man: Yes. The more aerodynamic the structure is, the more laminar the air flow becomes. But it's not just about speed. The design also affects the safety and comfort of travelling.

Woman: Look, that's our train. Now we can check if the assemblers did well.

Man: Let's go!

Post-listening – pronunciation and grammar

You may find it necessary to practise pronunciation of some vocabulary items, e.g. *evolve, entire, recently, assembly, require, etc.* First, drill the words one by one, then in longer phrases/chunks of language as it will help the students acquire them. If so, remember to follow the pattern:

1. THE TEACHER MODELS THE TARGET LANGUAGE THREE TIMES
2. THE STUDENTS REPEAT CHORALLY
3. THE STUDENTS REPEAT CHORALLY AGAIN
4. THE TEACHER HIGHLIGHTS KEY ASPECTS OF THE TARGET LANGUAGE
5. THE STUDENTS REPEAT CHORALLY
6. THE TEACHER NOMINATES INDIVIDUAL STUDENTS TO REPEAT INDIVIDUALLY WITH CORRECTION AS APPROPRIATE
7. THE STUDENTS REPEAT CHORALLY TO FINISH

GRAMMAR

The recording includes some sentences in the present perfect simple and continuous tenses, you may wish to explore this grammatical aspect and practise these tenses which often pose some challenge to students.

You can write the sentences on the board:

Have you noticed that our railway has recently evolved a lot? (PPS)

The entire rolling stock has been modernised. (PPS passive)

Yes, it's not just the trains that have been modernised, the whole production process has also been developing. (PPS passive, PPC)

Encourage the students to analyse the examples, name the tenses (PPS, PPC, some examples are in the passive) and tell them to decide why these tenses are used in the conversation. Revise the main usage of PPS and PPC, write it on the

board with some examples, preferably connected with the students' life/experience to make it more personal and thus easier to remember. Revise making questions and negative sentences and FOR/SINCE used to talk about the length of an activity plus typical adverbs (recently, lately, ever, never, etc). Prepare some grammar tasks for the students.

While dealing with grammar, bear in mind the following steps:

- present the target language in context and co-text to enhance understanding
- students notice/ focus on the target language
- deal with its meaning and use
- deal with its form, highlight it
- provide a controlled practice task to check if students got to grips with both its meaning and form
- provide some thorough pronunciation practice, highlight the features of connected speech, prominence, word stress, intonation; drill the whole sentences; be energetic and make it fun; use a variety of drilling techniques (choral, individual, pair, disappearing, substitution drills)
- to put it all into practice, provide a freer-practice activity, mirroring real life situations, where students use the target language in a natural context in speaking or writing

Speaking - FIND SOMEONE WHO

Explain the task to the students. They will have to do a survey and complete the cards. They will mingle and ask questions in PPS and PPC to as many students as possible, they should also try to get some more information. Demonstrate the activity by asking some students a question and eliciting more answers, e.g.:

Find someone who has been to a big live concert/music festival.

T: Have you ever been to a big live concert/music festival?

S: Yes, I have.

T: How many times?

S: About 5-6 times.

T: What's the best concert you have been to?

S: I think the one by Metallica.

CARD

FIND SOMEONE WHO:			
NO	QUESTION	NAME	MORE DETAILS
1	HAS BEEN LIVING IN THEIR HOUSE/FLAT THE LONGEST		
2	HAS NEVER BEEN TO WARSAW		

3	HAS BEEN MARRIED THE LONGEST		
4	HAS BEEN WORKING FOR THE SAME COMPANY THE LONGEST		
5	HAS BEEN ABROAD MORE THAN 10 TIMES		
6	HAS RECENTLY SEEN A GOOD FILM		
7	HAS BEEN LEARNING ENGLISH THE LONGEST		
8	HAS ALWAYS BEEN INTERESTED IN TRAINS		
9	HAS BEEN TRAINING SOME SPORT LATELY		
10	HAS WON ANY COMPETITION/LOTTERY		

Give the students about 10-15 minutes to complete the task. Monitor and help if necessary. Then ask individual students to present their findings to the class. At this stage the class can compare their information and have some fun.

SCREEN 4

Instructional Video

Pre-listening

The listening text is full of technical terminology, therefore it could be helpful to focus on the Polish equivalents of some items first. Distribute pictures of trains and ask the students to label the following parts:

- 1) *podwozie z wózkiem*
- 2) *układy przeniesienia napędu*
- 3) *piasecznice*
- 4) *odbierak prądu*
- 5) *urządzenie pociągowo-zderzne*
- 6) *zestawy kołowe*
- 7) *zawieszenie silników trakcyjnych*
- 8) *urządzenia hamulcowe*
- 9) *mechanizmy napędowe*



Listening for detail (1)

Tell the students to watch the instructional video entitled: "The technical elements of rolling stock" and write the English words next to the Polish ones on the picture of the train with labels. Open-class feedback.

Answers:

- 1) underframe with bogies
- 2) drive trains
- 3) sand boxes
- 4) pantograph
- 5) buffer
- 6) wheelsets
- 7) traction motor suspension
- 8) brakes
- 9) drive mechanisms

Listening for detail (2)

Ask the students to complete the missing information (write these sentences on the board):

- 1) Rail vehicles, due to the type of their underframe, can be divided into two main groups:
- 2) We can distinguish traction vehicles with
- 3) The underframe of vehicles with directly mounted wheelsets consists of
- 4) Wheelsets are the most important technical elements of rail vehicles as they are the link between
- 5) There are, ... and brakes.

Open-class feedback. Write the answers on the board.

Answers:

- 1) with wheelsets mounted directly on a vehicle or indirectly on a bogie
- 2) powered wheelsets and trailer bogies
- 3) a vehicle frame and the wheelsets
- 4) the vehicle and the track rails

5) block, disc and track

Listening for specific information (3)

Exercise 3

The students have to assign the elements to the appropriate group. Play the video. Let the students compare their answers before conducting open-class feedback.

Answers:

1. BRAKING: track brakes, disc brakes, block brakes, system.
2. WHEELSET: axle, rail wheels, driving wheels, carrying wheels.

Feedback incorrect answers:

1. This word is related to the wheelset of the train.
2. This word is related to the braking system of the train.

SCREEN 5

Exercise 4

The students must read the statements and complete them with the words given in the source list. Deal with any difficulties that the students might encounter. Encourage individual students to read out the answers (whole sentences) after about 5 minutes.

Answers:

- 1) bogie-less
- 2) bogies
- 3) wheelsets
- 4) frame
- 5) carrying
- 6) block
- 7) driving
- 8) axle

Feedback:

1. They are divided according to the type of chassis.
2. This applies to both traction vehicles and carriages.
3. They are the most important technical elements of rail vehicles.
4. These two elements support each other.
5. These two sets can also be present in the bogie structure.
6. Type of brakes where the braking element are blocks which are pressed around the rim of the braked wheel.
7. This is an element that distinguishes them from bogied vehicles.
8. They are permanently attached in wheelsets.

Tapescript

Title: The technical elements of rolling stock

Rolling stock consists of essential elements, such as an underframe with bogies, wheelsets, traction motor suspension, drive mechanisms, drive trains, brakes, a buffer, sand boxes, pantographs and many more.

Rail vehicles, due to the type of their underframe, can be divided into two main groups: with wheelsets mounted directly on a vehicle or indirectly on a bogie.

In rolling stock with bogies, both the traction vehicles and carriages have an underframe, that is bogies, which are connected to the body frame. We can distinguish traction vehicles with powered wheelsets, and trailer bogies.

The underframe of vehicles with directly mounted wheelsets consists of a vehicle frame and the wheelsets. These two elements support each other. These vehicles are equipped with powered wheelsets.

Another element of the rolling stock is the bogie - a part of the underframe. Axles with wheelsets are fixed in it and it has the ability to rotate in relation to the body mounted on it.

Wheelsets are the most important technical elements of rail vehicles as they are the link between the vehicle and the track rails. Similarly to the bogies, drive units and non-driven units are distinguished, also known as rolling wheels. The construction of axle units isn't complicated as they consist of an axle and wheels which are permanently installed.

A device with a very large impact on the safety of driving is a brake system. It reduces the speed of the vehicle and stops it in the final phase of braking. There are block, disc and track brakes.

SCREEN 6

Listening

Lead-in

Listening (1)

The class will listen to the narration describing the final stage of producing a train carriage – assembling the interior elements. Make them guess 1) what elements need to be put together before you play the recording. They will also have to 2) pay attention to the methods/materials used in the process.

Play the recording and check the students' ideas. Open-class feedback.

Possible answers:

- 1) interior panels, cladding, the floor, sheathing, windows
- 2) acrylic tape, gel tapes, acrylic adhesive, hybrid sealants, polyurethane sealants, structural adhesive

It might be necessary to revise/explain/pre-teach some key vocabulary items before doing the task, such as:

interior (n) = the inside part of something

replace (v) = take the place of something, or to put something or someone in the place of something or someone else

joint (n) = a place where two things are fastened together

rivet (n) = a metal pin used to fasten flat pieces of metal or other thick materials such as leather

various (adj) = several and different

adhesion (n) = the action or process of adhering (sticking) to a surface or object

resistance (n) = the ability not to be affected by something, especially adversely

moisture (n) = a liquid such as water in the form of very small drops, either in the air, in a substance, or on a surface

ageing (n) = relating to getting older

significant (adj) = important or noticeable

cladding (n) = a covering or coating on a structure or material

adhesive (n) = a substance used for sticking objects or materials together; glue

tightly (adv) = closely and firmly

sheathing (adj) = a close-fitting covering designed to protect something

glue (v) = fasten or join with or as if with glue

sealant (n) = material used for sealing something so as to make it airtight or watertight

bonding (n) = joining two materials

non-flammability (n) = the quality of not being flammable (easily set on fire) or easily burned

Listening (2)

Exercise 5

The students should listen to the recording once more and do Task 5 – form pairs of words to make collocations connected with the lesson. Play the recording and check the answers by encouraging volunteers to share their answers with the class.

Answers:

1. Sheathing - external
2. Tape - acrylic
3. Bonding - structural
4. Sealant - hybrid
5. Connections - mechanical
6. Panels - wall

7. Standards - non-flammable

8. Industry - assembly

Feedback:

1. Its assembly involves gluing the wall panels to the carriage frame.
2. It is often used to connect panel elements.
3. Structural adhesive is used for this.
4. Wall panels are glued to the carriage frame with it.
5. For example, rivets, bonds and welding.
6. External sheathing is made of them.
7. Make sure that the structure meets them.
8. Acrylic tapes are a very useful material here.

Tapescript

Title "Assembly of the interior elements"

A train can be put into service once all finishes are in place. There are several aspects to finishing the assembly. The first is the interior. Panels are often joined with acrylic tapes. They are used successfully in the assembly industry. Gel tapes, in turn, are replacing mechanical joints such as rivets, bolts and welding. Acrylic tapes create strong connections on various surfaces, such as metals, plastic or glass. The advantage of gel tapes is their high level of adhesion. Resistance to difficult weather conditions, as well as to moisture, vibrations and ageing, are also significant advantages.

The next area of assembly is the installation of cladding. In most cases acrylic adhesive is also used to attach it. Floor assembly involves fixing the floor panels to a metal or wooden structure. It is important to install the panels tightly. Installation of external sheathing entails gluing the wall panels to the carriage frame using hybrid sealants. After installing the sheathing, the front and side windows are put in and secured using hybrid or polyurethane sealants. Structural bonding - for which structural adhesive is used - is the final stage. It is necessary to make sure that the entire structure meets the non-flammability standards.

SCREEN 7

Exercise 6

Lexis

The students must guess the hidden words. Open-class feedback.

Answers and feedback:

1. BONDING

Permanent joining of parts.

Feedback: This can be performed with hybrid sealants.

2. SHEATHING

It consists of wall panels.

Feedback: Also, cladding.

3. WELDING

Method of mechanical joining of components.

Feedback: Increasingly being replaced by gel tapes.

4. BOLT

A mechanical fastener.

Feedback: It has a thread.

5. CARRIAGE

A component of a train.

Feedback: It has a frame to which wall panels are attached.

6. PANELS

They are components of the sheathing.

Feedback: They can be wall panels or floor panels.

7. TAPE

It is used to create joints.

Feedback: It can be acrylic or gel.

8. SEALANT

It is used to mount windows.

Feedback: It can be hybrid or polyurethane.

SCREEN 8

GAME - Ixsis

In each round the students have to find the words that fit into the given category. After a few minutes check the answers with the whole group.

Answers:

1. ROLLING STOCK

Correct answers: bogie, locomotive, suspension, drivetrain, brakes

Incorrect answers: welding, plant, hall, sensor, wiring

2. BOGIE

Correct answers: chassis, wheelset, carrying, axles, wheels

Incorrect answers: brake, bolt, cladding, moisture, vibrations

3. BRAKE

Correct answers: block, disc, track, speed, stop

Incorrect answers: sheathing, glue, non-flammability, panels, sealant

SCREEN 9

Exercise 7

Lexis

The students must complete the crossword. They can work in pairs. Open-class feedback.

Answers:

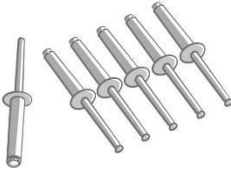
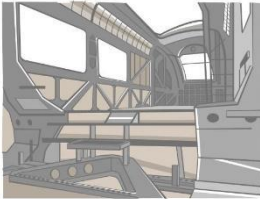
Lift	Crane or jack.
Adhesive	It can be structural.
Moisture	Gel tapes are resistant to it.
Cladding	Acrylic adhesive is used to assemble it.
Solebar	A carriage or locomotive element consisting of two longitudinal beams.
Sandboxes	Components of rolling stock.
Axle	Wheelset component.
Conductor	A part of the wiring that distributes the electric current.

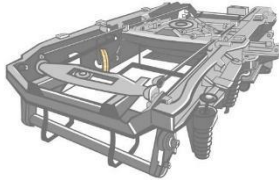
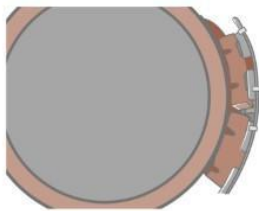
SCREEN 10

Exercise 8

The students are instructed to match a description to a picture. After a few minutes encourage some volunteers to read out the correct answers.

Answers:

Welding	
Rivets	
Train frame	

Chassis	
Bogie	
Brake	

Feedback:

1. A method of permanent joining of metal components with solder.
2. An element used to join flat components, usually in the shape of a short rod.
3. Stage of work before moving the train to the assembly hall.
4. Depending on the type of chassis, rail vehicles can be either bogied vehicles or bogie-less vehicles.
5. Chassis component of a rail vehicle where axles with wheels are installed.
6. A device used to reduce speed or stop the vehicle.

SCREEN 11

Reading

Lead-in

Ask the students some questions before they read the document to make them engaged in the topic, e.g.:

What is the solebar?

What are its functions?

What characteristics should it have?

Open-class feedback, possible answers:

- it is the bogie frame
- it supports all bogie mechanisms and equipment

- it must have a high load resistance - both static and dynamic, it should be light and rigid

Reading (1)

Ask the students to read the text and check the answers to the questions on the board. Open-class feedback.

Next, tell them to go through the document again and underline any new vocabulary items. Let them work in pairs to figure out what they mean in the given context. They will have access to the internet resources, they can use their phones as well. Elicit the words with both English and Polish explanations.

Probable answers:

transfer (v) = move from one place to another - przenosić

tractive force (n phr) = the act of drawing or pulling, esp. by motive power – siła pociągowa

dampen (v) = progressively reduce the amplitude of (an oscillation or vibration) – amortyzować

guide (v) = direct the motion or positioning of (something) – prowadzić

drivetrain (n) = the system in a motor vehicle which connects the transmission to the drive axles – zespoły napędowe

bearing (n) = a part of a machine that supports another part that turns around – łożysko

impact (n) = a marked effect or influence = wpływ

reliability (n) = the quality of being trustworthy or of performing consistently well - niezawodność

load resistance = the ability not to be affected by weight, especially adversely - wytrzymałość na obciążenia

light (adj) = not weighing a lot - lekki

rigid (adj) = not easily bent or changed in shape – sztywny

purpose (n) = the reason for which something is done or created or for which something exists – przeznaczenie

longitudinal (adj) = running lengthwise rather than across = podłużny

longitudinal members - podłużnice

parallel (adj) = side by side and having the same distance continuously between them – równoległy

beam (n) = a long, thick piece of wood, metal, or concrete, especially used to support weight in a building or other structure – belka

cross bearer (n) – poprzecznica = *headstock* (n) = a set of bearings in a machine, supporting a revolving part – czołownica

SCREEN 12

Reading for detail (2)

Exercise 9

The students are to complete the gaps in the sentences. Ask them to do it individually and then to refer to the document to verify their answers. Open-class feedback.

Answers:

1. solebar
2. transfers
3. bearing
4. load
5. longitudinal members
6. safety
7. light
8. headstock

Feedback:

1. It contains all the bogie mechanisms and equipment.
2. This enables the wheelset to be driven.
3. It is also supported by wheelset suspension systems.
4. Both static and dynamic.
5. Also called solebar beams.
6. The reliability of a rail vehicle also depends on this.
7. It should not overload the chassis.
8. They are the elements of the train structure that are arranged across in relation to the track.

DOCUMENT

Title: The construction and functions of the solebar

For **assembly operations**, a very important element of the train structure is the **solebar**, or the bogie frame. The solebar supports all bogie mechanisms and equipment. The solebar makes it possible to transfer tractive forces and dampen vibrations, as well as to guide the wheelsets. This element is also necessary for correct operation of the braking system and the drivetrain. The frame of the bogie is supported in the wheelsets thanks to bearing assemblies and the suspension systems.

The structure of the **frame** has a direct impact on the safety of driving and on the reliability of the **rail vehicle**. This element must therefore have a high load resistance - both static and dynamic. The solebar should be light and rigid. Its shape depends on the number of wheelsets, the type of drivetrain and braking systems, and the design speed of the train. Though the frame can be designed in a number of ways according to its purpose, some common parts can be

identified. Every solebar has two longitudinal members, which are elements of the frame installed in parallel to the centre line of the track. They are also known as solebar beams. The other component of the solebar are the **cross bearers (headstock)**, that is components arranged across the centre line of the track.

SCREEN 13

Exercise 10

The students are asked to complete the table with the correct forms of the words. After a few minutes conduct open-class feedback.

Answers:

	VERB	NOUN	ADJECTIVE
1	conduct	conductor	conductive
2	qualify	qualifier/qualification	qualified
3	travel	traveller	well-travelled
4	speed	speed	speedy
5	industrialise	industry	industrial
6	weld	weld / welder	welded
7	assemble	assembly	assembled
8	seal	sealant/seal	Sealed

Extra idea

It is worth drawing the students' attention to the fact that learning new vocabulary items can be facilitated by forming lists/diagrams/charts of word families like the one in Task 10. Ask the students to make sentences with all the words in the table at home. Remember to check this homework assignment at the beginning of the next lesson.

SCREEN 14

Exercise 11

The students are asked to match the given questions with the ones which explain the essence of their meaning. Open-class feedback.

Answers:

1. Why is there a braking system? → What is its purpose?
2. Where is the tool I need? → What is its location?
3. Why are you welding it? → What is the reason behind this action?
4. How long does it take? → What is the duration of this action?
5. Whose is this design? → What is the name of the person who did it?
6. When is the deadline? → How much time is left?
7. Which design is better? → Which option would you recommend?
8. Whom should I ask about it? → Who knows the answer?

SCREEN 15

Exercise 12

Instructions: Find the hidden words. The students have to do it individually, then ask volunteers to give the answers.

Answers:

1. Welder
2. Bolt
3. Rolling stock
4. Structure
5. Carriage
6. Solebar
7. Brakes
8. Cross bearer

SCREEN 16

Report

LESSON NOTES

Professional area: electrics and electronics

Professional group: electrics, electronics and energy engineering

Business: railway infrastructure management

Profession: railway power engineering technician

Qualification symbol: EE.28.2.

Module: Operation of railway vehicles

EE.28.2. Operation of railway vehicles

SCREEN 1

Cover Page

SCREEN 2

Dialogue Video

Lead-in

Tell the students that they will watch a video entitled "*Repair of an electric locomotive*". Before they see the episode, make them work in pairs and predict the correct order (from 1 to 14) of the following activities/stages of the repair process.

Write the stages on the board:

- G. Repairing
- E. Removing paint coating
- C. Washing the locomotive
- I. Re-assembling the equipment and installation

- L. Removing the pantograph and other parts
- B. Passing all the components to specialised sections for repair and maintenance
- A. Removing electric and pneumatic installations
- J. Applying a special anti-corrosion coating
- M. Transferring the locomotive to the dismantling line
- H. Filling and painting the box
- F. Removing the body from the underframe
 - K. Joining the box with bogies and placing devices on the roof of the vehicle
 - N. Testing the locomotive
- D. Clearing the box of rust

Explain/revise/pre-teach any difficult vocabulary items, such as:

remove (v) = take something or someone away from somewhere, or off something

coating (n) = a layer of a particular substance that covers a surface

apply (v) = spread or rub a substance such as cream or paint on a surface

transfer (v) = move someone or something from one place, vehicle, person, or group to another

bogie (n) = an undercarriage with four or six wheels pivoted beneath the end of a railway vehicle

dismantle (v) = take (a machine or structure) to pieces

maintenance (n) = the process of keeping something in good condition – konserwacja

fill (v) = put a substance into an empty space - wyszpachlować

underframe (n) = the supporting frame or substructure of something, in particular a vehicle

pantograph (n) = a jointed framework conveying a current to a train, tram, or other electric vehicle from overhead wires

Open-class feedback, the students propose the right order.

Listening (1)

Play the video and ask the class to check/correct their answers – ordering the stages. Let them compare their answers with their partners. Open-class feedback.

Answers:

1. C 2. M 3. F 4. L 5. B 6. A 7. E 8. D 9. J 10. G 11. I 12. H 13. K 14. N

Listening for detail (2)

Exercise 1

The students have to read the sentences and decide if they are TRUE or FALSE. Deal with any problems connected with comprehension. Encourage the group to guess the right answers before they watch the episode again.

Depending on the level of the class, you might need to explain/revise/pre-teach some vocabulary, e.g.:

draw up (v) = prepare something, usually something official, in writing

delivery and acceptance protocol – protokół zdawczo – odbiorczy

undergo (v) = experience or be subjected to

shot blasting room – śrutownia

paint coating – powłoka lakiernicza

rust (n) - rdza

secure (v) = protect against threats; make safe

recurrence (n) = the fact of occurring (happening/taking place) again

measurements – pomiary

pressure – nacisk

adjust (v) = alter or move (something) slightly in order to achieve the desired fit, appearance, or result

fault (n) – usterka

hand over (v) = give something to someone else

operation – eksploatacja

After the students watch the episode, let them compare the answers with their peers before you conduct open-class feedback.

Answers:

1. F 2. T 3. F 4. T 5. T 6. F 7. T 8. T

SCREEN 3

Listening for specific information (3)

Exercise 2

The students have a multiple choice exercise to do, there are 8 statements and 3 options to choose from in each case. Make them read everything carefully and explain any problematic points. Give the class some time to predict the answers before you play the video once more. Open-class feedback.

Answers with feedback:

1. C. a delivery and acceptance protocol

Feedback: The employee of the plant gave it to the woman to sign.

2. B. vehicle documents

Feedback: The documents confirm the vehicle has been authorised to be put into operation.

3. A. dismantling line

Feedback: The body is removed from the frame there.

4. A. current collectors, starting resistors

Feedback: These components are subject to repair and maintenance.

5. A. removing the paint coating and cleaning the locomotive of rust

Feedback: The locomotive is also protected against the recurrence of corrosion.

6. C. attach the body to the assembled bogies

Feedback: Place all equipment on the roof of the vehicle.

7. B. brake tests

Feedback: Pneumatic devices are also tested.

8. A. a commissioning protocol

Feedback: An appropriate document should be prepared.

Post-listening – pronunciation

It might be worth practising pronunciation of some difficult terms, such as: *delivery, acceptance, dismantling, resistor, maintenance, etc.* After drilling them as separate items, drill them in longer phrases/sentences.

Remember to follow the pattern:

1. THE TEACHER MODELS THE TARGET LANGUAGE THREE TIMES
2. THE STUDENTS REPEAT CHORALLY
3. THE STUDENTS REPEAT CHORALLY AGAIN
4. THE TEACHER HIGHLIGHTS KEY ASPECTS OF THE TARGET LANGUAGE
5. THE STUDENTS REPEAT CHORALLY
6. THE TEACHER NOMINATES INDIVIDUAL STUDENTS TO REPEAT INDIVIDUALLY WITH CORRECTION AS APPROPRIATE
7. THE STUDENTS REPEAT CHORALLY TO FINISH

Tapescript

Title: Repair of an electric locomotive

M: Before we accept the locomotive for repair, we have to check the condition of the vehicle and its equipment, and draw up a delivery and acceptance protocol.

K: Of course, here are the vehicle documents. Could you explain the process of repairing an electric locomotive to me?

M: The locomotive will be washed and then transferred to the dismantling line, where we'll remove the body from the underframe. Next we'll remove the pantograph, starting resistors and other parts.

K: Are all the components passed to specialised sections to be repaired and undergo maintenance?

M: Yes, that's necessary.

K: What happens to the locomotive next?

M: The locomotive box is directed to the repair line. After removing all the parts and electrical and pneumatic installations, we transport them to the shot-blasting room, where the paint coating is removed. Then we clear the box of rust.

K: Do you secure the locomotive box against the recurrence of corrosion?

M: We apply a special coating and then proceed to the repair. We reassemble the equipment and installation. When the work is finished, we fill and paint the box.

K: Is it possible to take measurements then?

M: Before proceeding to the measurements, it's necessary to join the box with bogies and place devices on the roof of the vehicle.

K: What happens then?

M: The locomotive is tested. Tests of brake and pneumatic devices, as well as other tests, are performed at the control and measurement station.

K: Do you check the pressure on the wheelsets?

M: Yes. And when necessary, we adjust them and then pass the locomotive for a test drive.

K: And if there are no faults can I collect the locomotive?

M: Yes, after successfully passing all the tests, the vehicle will be officially handed over for operation.

K: Thank you, I'll be waiting for your call, then.

SCREEN 4

Instructional Video

Lead-in

Ask the students the following questions:

What does revision repair of rolling stock include?

Do you know any equipment used to check some elements?

Elicit some answers from the class.

Listening for gist and key vocabulary items (1)

Inform the students that the video includes a lot of technical terminology.

Write some Polish words on the board, the students' task will be to try and note down their English equivalents while listening. With less confident students you might provide the class with a source list of the English words so they will just have to match the pairs. Play the video and then check the answers with the whole group.

PROPOSED LIST OF POLISH TERMS:

1. ślusarstwo -
2. stolarstwo -
3. kanał -
4. urządzenia dźwigowe -
5. silniki trakcyjne -
6. badanie kołowe -
7. defektoskop ultradźwiękowy -
8. montaż -
9. urządzenia hamulcowe -
10. ciśnienie w cylindrach -
11. sprężarki -
12. zużycie -
13. wydajność -
14. zderzaki -
15. zawór -

If you decide to give your students a source list with the English equivalents, do not forget to put the words in random order.

Answers:

1. locksmithing
2. carpentry
3. maintenance pit
4. lifting devices
5. traction motors
6. circular test
7. ultrasonic flaw detector
8. assembly
9. braking devices
10. cylinder pressure
11. compressors
12. wear
13. performance
14. bumpers
15. valve

Open-class feedback – write the items on the board.

Listening – analysing technical vocabulary and its meaning (2)

It seems reasonable to print the tapescript and distribute the copies to your students before they watch the video again. Make them work in pairs, read the text and underline some vocabulary items that they do not understand (tell them to focus mainly on elements of devices). They will watch the video, you

will stop the film a few times so that they can figure out the Polish meaning by following the recording and looking at the images with explanations.

Open-class feedback.

Answers:

The students will probably concentrate on such words:

cracks – pęknięcia, leaks – przecieki/nieszczelności, spring hangers – wieszaki, steal leaf springs – sprężyny piórowe, coil springs – sprężyny śrubowe, pipelines – przewody rurowe, brake cylinders – siłowniki hamulcowe, lever and pull system – układ dźwigniowo-ciężłowy, automatic adjustment – samoczynne nastawianie, the stroke ratio of the piston – wielkość skoku tłoka, couplers – sprzęgi, tightness – szczelność, etc

Listening for detail (3)

Exercise 3

The students should complete the sentences using the words from the source list. Ask them to do the task individually before you play the video the last time. More advanced students might not need to watch the video again. Open-class feedback.

Answers:

1. servicing
2. maintenance pit
3. traction
4. flaw detector
5. bogies
6. braking
7. compressor
8. subassemblies

Feedback:

1. These repairs also include carpentry, painting and cleaning.
2. A free space over which a vehicle is placed to repair the chassis.
3. Powered with electrical energy.
4. Use of this device makes it possible to detect internal defects or cracks in the wheel.
5. A component of the chassis where the axles and wheels are installed.
6. A system used to slow down and stop the train.
7. A device used to raise the gas pressure in a given object.
8. Assemblies of structural components that form a part of a device.

Tapescript

Title: Revision repair of rolling stock

The revision activities include locksmithing, carpentry, painting repairs and

cleaning works.
The bogies are placed at stations equipped with a maintenance pit and lifting devices. Their traction motors are removed and they are then transferred to the repair section. The bogie frames and wheelsets are washed, inspected and accurately measured.
The circular test is carried out using an ultrasonic flaw detector that allows detection of internal defects or cracks in an element. It is also necessary to check the status of spring hangers and steel leaf and coil springs. When the repairs are done, the wheelset is measured and tested again and then subjected to painting and drying. Finally, it is submitted for assembly.
Repair of braking devices includes pipelines, valves, brake cylinders, mechanical parts of the lever and pull system, air reservoirs and automatic adjustment of brake blocks. After making the necessary repairs, the brake system is checked for leaks. It is also important to check the stroke ratio of the piston of the brake cylinders and the cylinder pressure. The functionality of the braking devices is also checked at equal positions of the controller.
Before any repairs are made, the compressors are started to evaluate their operation and reveal possible defects. Next, the compressor is dismantled and its parts are washed and checked for wear. After the repairs are done, the compressor's performance and operation are checked during operation.
The key components of the rolling stock are couplers and bumpers. After thorough cleaning, the couplers are checked to identify the repairs or replacements needed. The final tests are carried out using a device enabling joining with the second coupling, disconnecting them and checking the valve operation and tightness of pneumatic devices.
After the repairs have been carried out, the rolling stock is comprehensively checked at the receiving sections and the vehicle movement then tested on the tracks.

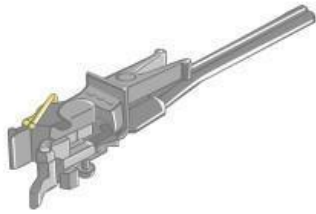
Exercise 4

Lexis

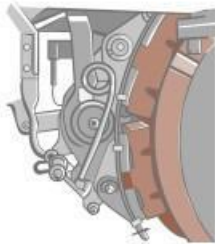
The students must match the expressions with the pictures. Open-class feedback.

Answers:

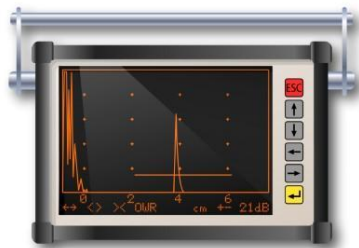
1. coupler



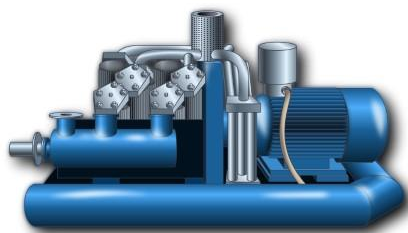
2. braking system



3. ultrasonic flaw detector



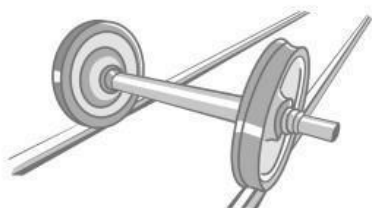
4. compressor



5. bogie



6. wheel



Feedback:

1. A device responsible for connecting (coupling) rail vehicles to each other, e.g. a locomotive to a carriage.
2. A system of connected components for reducing speed or stopping the vehicle.
3. A device used to detect material damage.
4. A device used to raise the gas pressure in a given object.
5. A chassis component of a rail vehicle where axles with wheels are installed.
6. The element of the bogie in contact with the rail.

SCREEN 5

Listening Comprehension

Lead-in

The students will listen to the recording about maintenance levels of railway vehicles. To make them more engaged in the topic ask them some questions like:

How many levels of maintenance do you think there are?

Can you describe any of them?

Why is maintenance so important?

Open-class feedback.

Listening for gist (1)

Tell the class to listen and take some notes which will characterise each level of maintenance. Play the recording and then encourage some volunteers to read out their notes.

Possible answers:

First level – inspections or monitoring of a railway vehicle before, during and after its departure

Second level – activities carried out at the specialised stations before putting the vehicle into operation

Third level – maintenance after the vehicle is taken out of service

Fourth level – repair maintenance activities carried out in dedicated technical and measurement stations

Fifth level – renewing or upgrading the standard of the railway vehicle

Listening for detail (2)

The students will listen to the recording again, ask them to write more details related to each level. Afterwards make the students compare their notes with their partners.

You may have to explain/revise/pre-teach some vocabulary items, e.g.:

distinguish (v) = recognize or point out a difference

involve (v) = have or include (something) as a necessary or integral part or result

assess (v) = evaluate or estimate the nature, ability, or quality of

subassembly (n) = a unit assembled separately but designed to be incorporated with other units into a larger manufactured product - podzespół

consumables (n) = elements that are quickly used and need to be replaced often – elementy eksploatacyjne

wear out = use or be used until no longer in good condition or working order
szybko zużywać się

disassembly (n) = the process of separating a machine or structure into its different parts

dismantle (v) = take (a machine or structure) to pieces

running gear (n phr) – układ biegowy

reworked (adj) – zregenerowany

Open-class feedback.

Suggested answers:

- 1) assessing the condition of the basic units, subassemblies and railway vehicle systems affecting traffic safety, equipping the vehicle with consumables, replacing consumables
- 2) checking the operation of the systems and inspecting components that do not require disassembly
- 3) The vehicle's technical condition is assessed in detail and, following disassembly, the systems and specific components are checked and inspected.
- 4) a detailed check of the technical condition of the assemblies and subassemblies after they have been dismantled
- 5) modifications to the body and running gears, and dismantling of assemblies and subassemblies to replace them with new or reworked ones

Tapescript

Five maintenance levels of railway vehicles can be distinguished.

The first level involves inspecting or monitoring a railway vehicle before, during and after its departure, including: assessing the condition of the basic units, subassemblies and railway vehicle systems affecting traffic safety, equipping the vehicle with consumables, replacing consumables that are used or that wear out quickly.

The second level involves activities at the specialised stations before the vehicle is put into operation. The technical condition of the machine is assessed by checking the operation of the systems and inspecting components that do not require disassembly.

The third level involves maintenance after the vehicle is taken out of service.

The vehicle's technical condition is assessed in detail and, following disassembly, the systems and specific components are checked and inspected. The fourth level refers to repair maintenance activities carried out in dedicated technical and measurement stations. This involves a detailed check of the technical condition of the assemblies and subassemblies after they have been dismantled.

The fifth level concerns renewing or upgrading the standard of the railway vehicle. This type of work is carried out in specialised plants and is basically about modifications to the body and running gears, and dismantling of assemblies and subassemblies to replace them with new or reworked ones.

Exercise 5.

The students have to match the expressions to their descriptions. The students can work in pairs. Open-class feedback.

Answers:

1. monitoring

Following and checking a process while it is happening.

Feedback: This may refer to driving a train on a specific railway line.

2. technical condition

The level of wear of a device or its components.

Feedback: Checked at the diagnostic station.

3. visual inspection

Checking the technical condition of a device or its components by looking at it.

Feedback: This is related to features visible to the naked eye.

4. assembly

Placing a component in a device or a vehicle.

Feedback: This may refer to the interior fitting out of a vehicle.

5. subassemblies

A set of components which make up a device.

Feedback: Brake pads, for example.

6. circuit

A closed system that allows electrical current to flow between the components of electrical systems.

Feedback: The technical condition of the circuits is checked at the third level of maintenance of railway vehicles.

7. repair

Resolving the problem.

Feedback: If this is not possible, the damaged part is replaced.

8. level

In other words: a stage.

Feedback: There are five stages in the railway vehicle maintenance procedure.

SCREEN 6

Exercise 6 – crossword puzzle

Lexis

The students will do the crossword puzzle. They can work in pairs or individually. Open-class feedback.

Answers:

rework	Restoration of a device or its parts to good technical condition.
operation	In other words: usage.
safety	Absence of danger, which can be ensured by keeping the vehicle in good technical condition.
disassembly	Dismantling of a device, vehicle etc. into its components.
frame	A component of a vehicle that forms the base for assembly of the other components.
diagnostics	Tests to assess the technical condition of a vehicle.
train	Also called a railway vehicle.
replacement	Removing a used component and putting a new one in its place.

SCREEN 7

GAME

Lexis

The students must "shoot" (select) the words related to rail transport service. Open-class feedback.

Answers:

1. **railway, rails, launching**
2. **brakes, technical condition, train**
3. **inspection, ship, body**
4. mooring line, quay, berth

5. lifeboat, **locomotive**, stern
6. **shot-blasting booth**, side, rudder
7. **bogie**, **wheel**, deck
8. **compressor**, **coupling**, **carriage**

Speaking activity

To practise the new language input ask the students to look through their notes and revise the key vocabulary items. After a few minutes they will have to present the five levels of maintenance of railway vehicles. Encourage volunteers to describe a different level each. Monitor the students and offer support.

Language feedback

Put some good, as well as some incorrect examples of students' language on the board. First, ask them to decide which ones are correct and mark them with a tick. Now, tell them to improve or correct the rest in pairs. Conduct thorough feedback in class, upgrading their language and correcting any mistakes.

SCREEN 8

Exercise 7 – T/F

Ask the students to read the 8 statements and decide if the sentences are TRUE or FALSE. Deal with any difficult points that the class may find hard to understand. The students can work in pairs. After a few minutes choose different pairs to read the sentences with their answers and give some more information that confirms their choice.

Answers:

1. T 2. F 3. F 4. T 5. F 6. T 7. T 8. T

Exercise 8

Lexis

The students are told to complete the table in such a way as to create expressions related to railway infrastructure. Check the answers with the whole class.

Answers:

1. technical - condition
2. diagnostic - examination
3. leaf- spring
4. disassemble - components
5. ultrasonic - flaw detector
6. running - gear
7. traction - motor

8. pneumatic - system

SCREEN 9

Reading

Lead-in

Tell the students that they will read a document entitled "**Operation of railway vehicles**". Make them consider some terms which appear in the text beforehand. Ask them to discuss what they apply to, why they might be mentioned in this document. They should work in pairs and compare ideas. Put the following expressions on the board:

- 1) regular technical inspections
- 2) the Regulation of the Minister of Infrastructure
- 3) qualified staff
- 4) the technical maintenance documentation
- 5) document the maintenance

Open-class feedback.

Reading (1)

Ask the class to read the document, underline the expressions written on the board and check what they really refer to.

It might be necessary to revise/explain/pre-teach some vocabulary items either at this stage (before the 1st reading) or after the students read the text once.

Proposed items:

proper (adj) = suitable or appropriate

determine (v) = control or influence something directly, or to decide what will happen

whether = if

excessively (adv) = to a greater degree or in greater amounts than is necessary, normal, or desirable - nadmiernie

worn (adj) = damaged and shabby as a result of much use - zużyty

significant (adj) = important

impact (n) = a marked effect or influence

prevent (v) = keep (something) from happening

compliance = the state or fact of according with or meeting rules or standards

entity (n) - podmiot

facility (n) = a place, amenity, or piece of equipment provided for a particular purpose

applicable (adj) = relevant or appropriate

obliged (adj) = obligated - zobowiązany

data (n) = facts and statistics collected together for reference or analysis

malfunction (n) = a failure to function normally

Open-class feedback.

Probable answers:

- 1) The proper operation of a rail-vehicle requires regular technical inspections.
- 2) It sets out the technical and organizational requirements.
- 3) Railway vehicles should be inspected and maintained by entities that employ qualified staff.
- 4) Works listed in it must be carried out correctly.
- 5) Railway operators, infrastructure managers and users of railway sidings are obliged to document the maintenance of railway vehicles.

Extra idea:

To practise forming questions and answering them on the basis of the text you can arrange a special task.

You can briefly revise the main rules connected with forming questions.

- 1) INVERSION – if there is a modal verb/to be/the passive structure in the sentence, e.g.:

Railway vehicles should be operated in

How should railway vehicles be operated?

- 2) USING THE AUXILIARY VERB (DO/DOES/DID) + the basic verb form, e.g.:

Proper operation of the rail means of transport requires

What does proper operation of the rail means of transport require?

Elicit different kinds of WH-questions from the class, put the beginnings on the board:

What

Who

Why

Where

When

How often

How many

How much, etc

If the students prefer, they can work in pairs. Their task is to read the text and make 5 wh-questions which will check the understanding of the document.

Give them a few minutes to finish the activity. Monitor and offer help if needed.

Ask different pairs to read out their questions – they will read one question and choose one student to answer it and so on.

Document

Operation of railway vehicles

The proper operation of a rail-vehicle requires regular **technical inspections** and repairs of the rolling stock. Checks should be made to determine whether the machinery, equipment and moving parts of vehicles are not excessively worn from daily operation. These checks have a significant impact on the safety of travel and prevent expensive repairs to larger **subassemblies**. Railway vehicles should be operated in compliance with the **technical** and organisational **requirements** set out in the Regulation of the Minister of Infrastructure.

Railway vehicles should be inspected and maintained by entities that employ qualified staff and have suitable technical facilities. The entities must also meet all applicable organisational conditions, so that the works listed in **the technical maintenance documentation** can be carried out correctly.

Railway operators, infrastructure managers and users of railway **sidings** are obliged to document the maintenance of railway vehicles. This mainly includes vehicle data, information on malfunctions and repairs, and all kinds of test reports.

SCREEN 10

Exercise 9

The students have to read the statements and complete the gaps using the words from the source list. Deal with any problems connected with understanding that may arise. Open-class feedback.

Answers:

1. inspections
2. machines
3. operation
4. requirements
5. Infrastructure
6. Inspection
7. facilities
8. document

Feedback:

1. All necessary repairs must be made.
2. The equipment and moving parts of the vehicle should be subject to the same inspection.
3. In other words: usage.

4. Also: organisational.
5. This is a branch of the government administration.
6. In other words: supervision.
7. They must have appropriate equipment to perform tests and repairs.
8. This documentation mainly includes vehicle data, information on malfunctions and repairs, and all kinds of test reports.

Exercise 10.

The students are told to mark the sentences you could hear from a locomotive repair technician. After a few minutes discuss the answers with the whole class.

Answers:

1. **We'll remove the body from the underframe.**
2. It is probably the most polluted body of water in the world.
3. **I'll apply a special coating and then proceed to the repair.**
4. I'd like to repair my relationship with my in-laws.
5. My brakes locked and I couldn't avoid the collision.
6. **We're going to test the braking devices.**
7. **At the end we're going to paint the body.**
8. I didn't paint that landscape in the end.

Extra idea

Task 10 clearly shows that a lot of words in English can have different meaning depending on the context. You might further explore the topic and ask the students to do some research online and find as many different meanings of the given words as possible. It can be set for homework.

Possible answers:

BODY:

- 1) the whole physical structure that forms a person or animal
- 2) the main part of a person's or animal's body, without the head, or without the head, arms, and legs
- 3) a dead person
- 4) the painted metal shell of a vehicle, such as a car or an aircraft
- 5) a group of people who have joined together for a particular reason
- 6) a large amount of something
- 7) the main or central part of something, especially a building or text
- 8) A body of water is a large area of water, such as a lake.
- 9) fullness or thickness of a person's hair

REPAIR:

- 1) VERB - a) to put something that is damaged, broken, or not working correctly, back into good condition or make it work again

b) If you repair something wrong or harmful that has been done, you do something to make it right.

- 2) NOUN - a) the action of repairing something
- b) a result of repairing something
- c) the relative physical condition of an object

BRAKE:

- 1) NOUN – a) a device that slows or stops the movement of a vehicle
- b) a thing that slows or hinders a process
- 2) VERB - to make a vehicle go slower or stop, using its brake or brakes

PAINT:

- 1) to cover a surface with paint
- 2) to make a picture using paints
- 3) If you paint your nails or face, you put make-up on that part of your body.
- 4) to give a description of
- 5) to create (a graphic or screen display) using a paint program

SCREEN 11

Exercise 11

The students are asked to put the expressions in the correct groups. Open-class feedback.

Answers:

- 1. Braking system: piping, valves, brake cylinders, lever and cable system, air reservoirs, brake pads
- 2. Bogie: underframe, axles, wheelsets, leaf springs, coil springs

Feedback incorrect answers:

- 1. It is a part a of the train bogie.
- 2. It is a part of the train braking system.

Exercise 12

The students' task is to complete the reported sentences. Depending on the level of the group it might be advisable to revise the main use and rules of Reported Speech. Try to elicit some information from the students. You can write the main points on the board.

USE

We report what another person has said, we usually do not use the speaker's exact words (direct speech), but reported (indirect) speech.

RULES

If the reporting verb is in the Simple Past (said, told me, etc) you must transform a given sentence and change:

- tense(s) (backshift)

- pronoun(s)
- place and time expressions

QUESTIONS

In Reported Speech questions are transformed to form a statement (there is no inversion or an auxiliary verb), the most common reporting verb is ASKED.

YES/NO question - you use IF/WHETHER, e.g.:

“Do you like your job?”

Tim asked me IF/WHETHER I liked my job.

WH-question – you use wh-word, e.g.:

“Where is he going?”

Bob asked me WHERE he was going.

COMMANDS/REQUESTS

When we want to report an order or request, we can use verbs like “tell” or “ask” with a to-clause, e.g.:

“Go away!”

He told me to go away.

“Please don’t shout.”

She asked me NOT to shout.

Direct Speech	Reported Speech
Simple forms	
Simple Present	Simple Past
Simple Past	Past Perfect
Present Perfect	
Past Perfect	
will	would
Progressive forms	
am/are/is	was/were
was/were	had been
has been	
had been	

Direct Speech	Reported Speech
this evening	that evening
today/this day	that day
these days	those days
now	then
a week ago	a week before
last weekend	the weekend before / the previous weekend
next week	the following week
tomorrow	the next/following day
here	there

Answers:

1. Technician: 'I'm going to start the repair today.'
The technician said that he [**was going to start**] the repair [**that day**].
2. Technician: 'I'll need the documentation of this locomotive.'
The technician said that he **would need** the documentation of [**that**] locomotive.
3. Rob, the operator of the locomotive: 'Will you call me once my locomotive is ready?'
Rob asked the technician if he [**would call**] him once [**his**] locomotive was ready.
4. Rob: 'I thought it takes more time to repair these things.'
Rob said he [**had thought**] that it took more time to repair [**those**] things.

Feedback:

1. a: The direct sentence used 'to be going to' in the present so backshift the reported sentence to the past.
b: You need two words and one of them is a pronoun which is the singular form of 'those'.

2. a: The direct sentence is in Future Simple, so backshift the reported sentence to Future-in-the-Past.
b: Change the pronoun to the singular form of 'those'.
3. a: The direct question is in Future Simple, so backshift the reported question to Future-in-the-Past.
b: Change the possessive pronoun to refer to Rob.
4. a: The direct sentence is in Past Simple, so backshift the reported sentence to Past Perfect.
b: Change the pronoun to the plural form of 'that'.

SCREEN 12

Report

END – OF – COURSE TEST

NAME: _____

_____/85 POINTS

TASK 1

Fill in the gaps in the sentences with the words provided below

**MAINTENANCE PIT / SUBASSEMBLIES / BOGIES / SERVICING / TRACTION /
FLAW DETECTOR / COMPRESSOR**

1. Locksmith repairs are carried out during the _____ activities.
2. The bogies are sent to stations equipped with a _____.
3. The _____ motors are removed from the bogies.
4. Wheel testing is performed using an ultrasonic _____.
5. Some elements of _____ wear out due to friction.

_____/5 points

TASK 2

What are the five maintenance levels of railway vehicles?

____/5 points

TASK 3

Fill in the missing letters to make correct words.

r _ _ _ _ _	Restoration of a device or its parts to good technical condition.
o _ _ _ _ _ _ _	In other words: usage.
d _ _ _ _ _ _ _ _	Dismantling of a device, vehicle etc. into its components.
d _ _ _ _ _ _ _ _	Tests to assess the technical condition of a vehicle.
r _ _ _ _ _ _ _ _	Removing a used component and putting a new one in its place.

____/5 points

TASK 4

Complete the sentences with the words provided below.

TURNOUTS / TRACKS / SWITCHES / RAIL TRAFFIC / SIGNALS

1. _____ are sidetrack devices used to emit optical signals related to train movements.
2. Derailers are not used on main, passing and running _____ .

3. _____ are used to redirect moving rolling stock to one of two tracks.
4. Switches are part of railroad _____ .
5. A signal box is intended for carrying out activities related directly to controlling _____ .

____/5 points

TASK 5

Label the pictures



1. _____
2. _____



3. _____

____/3

TASK 6

Complete each gap with a single preposition.

The rail traffic-control system is responsible _____ the safe operation of railway vehicles within the railway network. The first systems _____ this kind were based _____ relays and computer systems.

The current Polish rail-traffic control system is depends _____ a combination of computer, relay and mechanical devices. The development of microprocessor technology has contributed _____ the implementation of hybrid systems that combine relays and computers.

This system consists _____ a host system, which can be perceived as an interface between the interlocking system and the operator. The host system is a set of devices that support controllers in the supervision and control of train traffic. When a conflict is detected, the system is able _____ adjust the railway traffic.

_____/7 points

TASK 7

Put the following elements into the two categories (0.5 points for each answer)

TURNOUT / RAILWAY TRANSPORT / SIDING / TRAFFIC-CONTROL / DERAILER / TRACKS / DISPATCH ROOM / INTERLOCKING LEVER

Track elements	Activities related to railway traffic

_____/4 points

TASK 8

Characterise the two types of Line block systems.

____/8 points

TASK 9

Match the words with their definitions

1. Power supply	a) Can be alternating or direct.
2. Crossing gate	b) Provision of electric energy to electrical devices.
3. Disconnecter	c) Makes it possible to turn off the power supply in a given section of the network.
4. Electric current	d) A road barrier.
5. Semaphore	e) This makes it possible for vehicles to be diverted from one track to another.
6. Transformer	f) It converts electric current into current of different parameters.
7. Lightning arrester	g) The component of the electrical circuit that protects equipment from the effects of voltage surges.
8. Turnout	h) It converts electric current into current of different parameters.

1. ____, 2. ____, 3. ____, 4. ____, 5. ____, 6. ____, 7. ____, 8. ____

____/8 points

TASK 10

Choose the correct option

1. I'll cut to the [chase/core/heart] because it's quite urgent.
2. [According/Accepting/Regarding] to the Technical Specifications for Interoperability (TSI) these are lines used at speeds above 200 km/h.
3. The demand for travel by train [means/translates/makes] that it is necessary to modernise the network.
4. I'll keep that in [mind/brain/head].
5. [Due to/As/Meanwhile] the use of high speed on the lines, let's agree that it must be a system that supplies the right amount of AC.

____/5 points

TASK 11

Select the components that make up the traction power network. (0.5 point for each correct answer)

1. Water tower
2. Overhead line system
3. Tracks
4. Overhead wires
5. Electrical substation
6. 3 kV DC switch room
7. Compartment of a passenger car
8. Commercial premises of the station tunnel.

____/4 points

TASK 12

According to their functions we may divide the wires used in an OCL into the following kinds:

- catenary wires -

- auxiliary wires -

- contact wires -

What are their functions ?

____/6 points

TASK 13

Complete the gaps in the sentences with the following words. There are more words than you need.

CANTILEVERS / SUPPORTING / WIRES / MASTS / GANTRIES / TRACTION / INSULATORS

1. The overhead contact system is suspended on _____ structures.
2. When using single suspension systems, reinforced concrete or steel catenary _____ are used.
3. Steel _____ are used to support the complex suspensions systems.
4. _____ are designed to insulate two sections, so that the electric potential of one section is not transferred to another one.
5. In _____ power networks, insulators are necessary to insulate the overhead contact system from the supporting structures.

____/5 points

TASK 14

Provide the English equivalents to the polish terms

1. Sieć jezdna -
2. Lina nośna -
3. Linia energetyczna -
4. Słup trakcyjny -
5. Trakcja elektryczna -

____/5 points

TASK 15

Fill in the missing letters to make correct words.

1. B _ _ _ _ _ G

Permanent joining of parts. This can be performed with hybrid sealants.

2. SH _ _ _ _ _ G

It consists of wall panels. Also, cladding.

3. W _ _ D _ _ G

Method of mechanical joining of components. Increasingly being replaced by gel tapes.

4. B _ _ _

A mechanical fastener. It has a thread.

5. C _ _ _ _ _ E

A component of a train. It has a frame to which wall panels are attached.

____/5 points

TASK 16

Complete the table with the correct forms of the words

	VERB	NOUN	ADJECTIVE
1	conduct	_____	conductive
2	qualify	_____	_____
3	_____	traveller	well-travelled
4	_____	speed	_____
5	industrialise	industry	_____

6	weld	_____	welded
7	_____	assembly	assembled
8	seal	_____	sealed

____/10 points

Key for the end-of-course test

TASK 1

1. Locksmith repairs are carried out during the **(servicing)** activities.
2. The bogies are sent to stations equipped with a **(maintenance pit)**.
3. The **(traction)** motors are removed from the bogies.
4. Wheel testing is performed using an ultrasonic **(flaw detector)**.
5. Some elements of **(bogies)** wear out due to friction.

TASK 2

Five maintenance levels of railway vehicles can be distinguished.

The first level involves inspecting or monitoring a railway vehicle before, during and after its departure, including: assessing the condition of the basic units, subassemblies and railway vehicle systems affecting traffic safety, equipping the vehicle with consumables, replacing consumables that are used or that wear out quickly.

The second level involves activities at the specialised stations before the vehicle is put into operation. The technical condition of the machine is assessed by checking the operation of the systems and inspecting components that do not require disassembly.

The third level involves maintenance after the vehicle is taken out of service. The vehicle's technical condition is assessed in detail and, following disassembly, the systems and specific components are checked and inspected.

The fourth level refers to repair maintenance activities carried out in dedicated technical and measurement stations. This involves a detailed check of the technical condition of the assemblies and subassemblies after they have been dismantled.

The fifth level concerns renewing or upgrading the standard of the railway vehicle. This type of work is carried out in specialised plants and is basically about modifications to the body and running gears, and dismantling of assemblies and subassemblies to replace them with new or reworked ones.

TASK 3

rework	Restoration of a device or its parts to good technical condition.
operation	In other words: usage.
disassembly	Dismantling of a device, vehicle etc. into its components.
diagnostics	Tests to assess the technical condition of a vehicle.
replacement	Removing a used component and putting a new one in its place.

TASK 4

1. signals, 2. tracks, 3. switches, 4. turnouts, 5. rail traffic

TASK 5

1. derailer, 2. turnout, 3. crossing signal box

TASK 6

The rail traffic-control system is responsible **[for]** the safe operation of railway vehicles within the railway network. The first systems **[of]** this kind were based **[on]** relays and computer systems.

The current Polish rail-traffic control system is depends **[on]** a combination of computer, relay and mechanical devices. The development of microprocessor technology has contributed **[to]** the implementation of hybrid systems that combine relays and computers.

This system consists **[of]** a host system, which can be perceived as an interface between the interlocking system and the operator. The host system is a set of devices that support controllers in the supervision and control of train traffic. When a conflict is detected, the system is able **[to]** adjust the railway traffic.

TASK 7

Track elements	Activities related to railway traffic
siding, turnout, derailer, tracks, interlocking lever	railway transport, traffic-control, dispatch room

TASK 8

Line block systems can be divided into **unidirectional** and **bidirectional**. **Unidirectional** block systems are in most cases electromechanical locks and they can be installed on double-track lines. Use of this type of block system permits travel in one direction only and its functionality is limited to protection against rear-end collision. When the train sets off on its journey, the block system is locked, and when it returns from the journey, the block system is unlocked. When the block system is locked, it is impossible to dispatch the next train on the trail.

Bidirectional block systems can be used on two-way traffic routes. As a head-on collision with an incoming train is possible, bidirectional block systems are responsible for determining the direction from which a train may be sent and excluding the possibility that a train will depart from the opposite station.

TASK 9

1. b, 2. d, 3. c, 4. a, 5. h, 6. f, 7. g, 8. e

TASK 10

1. I'll cut to the [**chase**/core/heart] because it's quite urgent.
2. [**According**/Accepting/Regarding] to the Technical Specifications for Interoperability (TSI) these are lines used at speeds above 200 km/h.
3. The demand for travel by train [**means**/translates/makes] that it is necessary to modernise the network.

4. I'll keep that in [**mind**/brain/head].
5. [**Due to**/As/Meanwhile] the use of high speed on the lines, let's agree that it must be a system that supplies the right amount of AC.

TASK 11

1. Water tower
2. **Overhead line system**
3. **Tracks**
4. **Overhead wires**
5. **Electrical substation**
6. **3 kV DC switch room**
7. Compartment of a passenger car
8. Commercial premises of the station tunnel.

TASK 12

According to their functions we may divide the wires used in an OCL into the following kinds:

- catenary wires, that is wires which are used to transfer mechanical energy but which do not conduct electric current,
- auxiliary wires, which transfer mechanical energy and also conduct electric current,
- contact wires (also called trolley wires) which only conduct electric current and are only subjected to the load of their dead weight.

TASK 13

1. supporting, 2. masts, 3. gantries, 4. insulators, 5. traction

TASK 14

1. Sieć jezdna - overhead contact system
2. Lina nośna - catenary wire
3. Linia energetyczna - power line

4. Słup trakcyjny - catenary mast
5. Trakcja elektryczna - traction power system

TASK 15

BONDING

SHEATHING

WELDING

BOLT

CARRIAGE

TASK 16

Complete the table with the correct forms of the words

	VERB	NOUN	ADJECTIVE
1	conduct	conductor	conductive
2	qualify	qualifier/qualification	qualified
3	travel	traveller	well-travelled
4	speed	speed	speedy
5	industrialise	industry	industrial
6	weld	weld / welder	welded
7	assemble	assembly	assembled
8	seal	sealant/seal	sealed