EdTRANS

Schülerinnen- und Schülermobilität
Wien – Bratislava
BS ETM - SPSE

4. November 2013 – 7. November 2013
Projektteil Wien

Aufgabenteil in englischer Sprache:

Unterrichtsmittel verwendet im Rahmen der gemeinsamen Unterrichtszeit an der BS ETM 1060 Wien
Inhalt: ausgewählte Themengebiete der Elektrotechnik und der Dualen Ausbildung

Exercises:

Topic: Electrical engineering and Dual education system

Konzept und Zusammenstellung BS ETM Wien: Regina Arnold, BEd und das Lehrerteam der BS ETM Wien

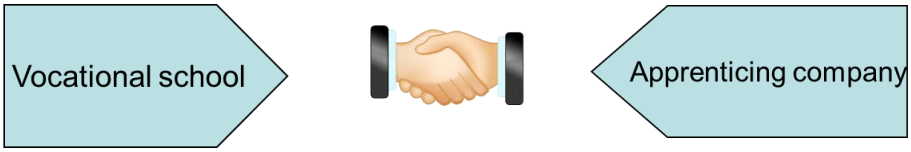
EUROPEAN UNION
European Regional Development Fund

creating the future
Programm zur grenzüberschreitenden Zusammenarbeit SLOWAKEI - ÖSTERREICH 2007-2013
Program cezhraničnej spolupráce SLOVENSKÁ REPUBLIKA - RAKÚSKO 2007-2013

I) UNIT ONE: DUAL EDUCATION – OUR SCHOOL

Deutsch:	Duale Ausbildung Berufsschule – Lehre - Lehrling
English:	Dual education (part-time) vocational school – apprenticeship - apprentice
Slovenský:	Učňovská škola - učenie - učeň

Dual education system in Austria



An apprentice = a trainee:
A person who is under an agreement to work for a number of years for someone who is skilled in a trade, in order to learn that trade.

The apprenticeship:
The condition or period of having a job as an apprentice: to serve an apprenticeship

www.apprentice.org.uk

The dual education system in Austria works like this:

1	Training period in electrical engineering:	3,5 to 4 years
2	Practical skills:	Training in an apprenticing company.
	1st and 2nd year of the training period:	Starts with learning basic mechanical skills, like filing, milling and turning. This will be followed by broad-based electrical training.
	3rd and 4th year of the training period:	Working under supervision of a skilled worker (instructor).

3	Theoretical knowledge of the profession:	Training in the vocational school.
	General knowledge and basic business skills:	Learning in the vocational school.
4	Training objective:	Apprenticeship diplomas

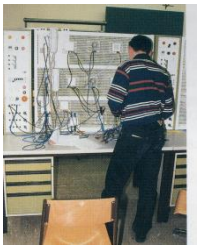
Our school

The first vocational school centre in Vienna's 6th district:

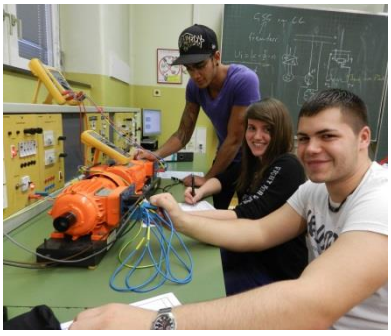
This school centre hosts part-time vocational schools for different professions:

- **electrical engineering and mechatronics**
- event operator
- information technology
- metal and glass processing
- plumber and heating engineering (HVAC installation)

The vocational school for electricians, electrical technicians and mechatronics is situated on the first and on the third floor.

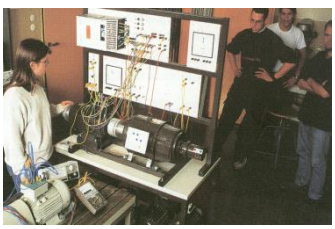


The school management is on the first floor. The different classrooms and the labs for learning and testing are on both floors. There are also rooms for computer applications for example for technical drawing and language training and practising basic business skills.



We teach apprentices in six different but similar professions for example different types of electricians for construction and maintenance and mechatronics.

The students get a wide range of skills needed in their professions.



According to the syllabus all students get training in general knowledge, such as political education and languages (German and English). They also learn basic business skills, like accounting and calculating, working on a PC and basic economics.

The apprenticeship usually lasts three and a half years and ends with a final examination, with includes practical and theoretical knowledge of the profession. But there are also four years courses possible which include special technical modules. Further is also the possibility of continuing studies to become for example an engineering technician.

Part-time vocational school – apprenticeship - apprentice

Our school is a part-time vocational school. That means, that the student has signed articles of apprenticeship. This contract between an employer = apprenticing company and the apprentice / student is fundamental for the apprenticeship. The trainee works for a company or a workshop and the attendance at school is compulsory.

Our courses are running as a block-release system for the trainee. Block-release system means to come to school twice a year for five to six weeks each time.

Our students work for industry enterprises like Wiener Linien, Wienstrom, JAW, Siemens Austria, the National Railway, Opel Austria, Otis and so on. Some of our trainees work for electricians.

II) UNIT TWO: CRAFTSMAN AND CRAFTSWOMAN

Deutsch:	HandwerkerIn – berufliche Fähigkeiten
English:	craftsman / craftswoman - skills
Slovenský:	Remeselník – odborné schopnosti

Put in the right verb in the following gap text:

Craftswomen and craftsmen _____a wide range of skills and knowledge to their work. They can _____ engineering drawings and _____ instructions.
Craftsmen and craftswomen in electrical engineering and electronics _____ mostly in production, service and maintenance.

They _____ and _____ machinery, equipment and electrical appliances, or _____ components. They _____ workshops, businesses and houses. They _____ testing and measuring instruments to _____ faults, and they can _____ all kinds of tools and machinery, from electric drills and hammers to automatic assembly lines.

apply, diagnose, exchange, install

interpret, read, repair, work, wire, use

Quellenverweis:
(adaptiert): Talking Networks / Unit 2B
Mit freundlicher Genehmigung:
Verlag Hölder-Pichler-Tempsky, Wien
www.hpt.at

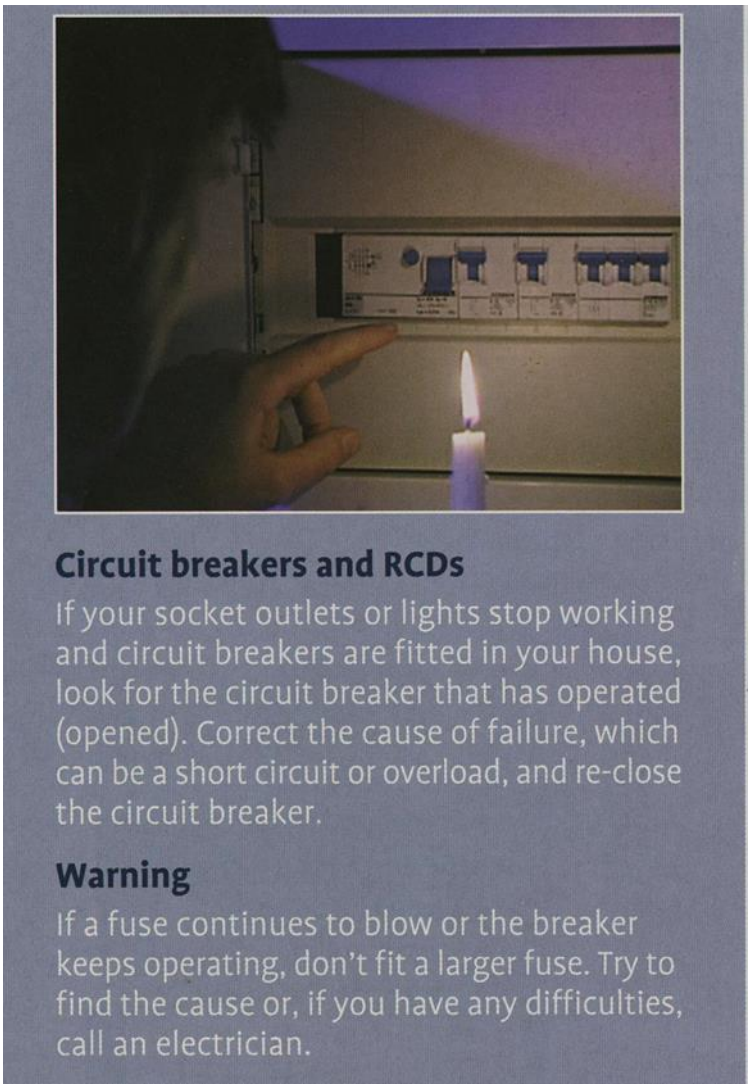
III) UNIT THREE: CHECK YOUR RCD

Deutsch:	Fehlerstromschutzschalter
English:	RCD – Residual current device
Slovenský:	Ochranný spínač pri poruche vedenia

Quellenverweis:
Der folgende Lesetext und die Arbeitsaufgaben dieser Lerneinheit wurden dem Lehrbuch „Talking Networks" Unit 18 B mit freundlicher Genehmigung des Verlages Hölder-Pichler-Tempsky, Wien entnommen. www.hpt.at (Unit adapted)

Check your RCD:

Read the customer information and tick the right statements on the next page:



Circuit breakers and RCDs

If your socket outlets or lights stop working and circuit breakers are fitted in your house, look for the circuit breaker that has operated (opened). Correct the cause of failure, which can be a short circuit or overload, and re-close the circuit breaker.

Warning

If a fuse continues to blow or the breaker keeps operating, don't fit a larger fuse. Try to find the cause or, if you have any difficulties, call an electrician.

Earth leakage circuit breakers

Many houses are now fitted with earth leakage circuit breakers, sometimes called residual current devices (RCDs) or residual current circuit breakers (RCCBs). These are sensitive devices intended to operate quickly if there is an earth fault.
A faulty appliance may cause the breaker to open. If this happens, correct the fault – unplug the faulty appliance – and try to close the breaker. If it opens again, remove all the circuit fuses or breakers and replace or reset them one at a time until you find the faulty circuit.
Leave this fuse or breaker out and telephone your electrical contractor or Electricity Board for assistance.

Testing

Earth leakage circuit breakers are fitted with a test button. This should be pressed every month to check that the breaker switches off. If it does not switch off, call an electrician.

If your light stop working

	call an electrician
	don't fit another fuse
	look for the circuit breaker that has opened

The cause of failure can be

	a short circuit
	an electrician's strike
	an overload

If the breaker keeps opening

	try to find the cause
	don't fit a larger fuse
	call an electrician for help

RCDs are

	residual current devices
	sensitive devices
	intended to operate quickly if there is an earth fault

The test button should be pressed

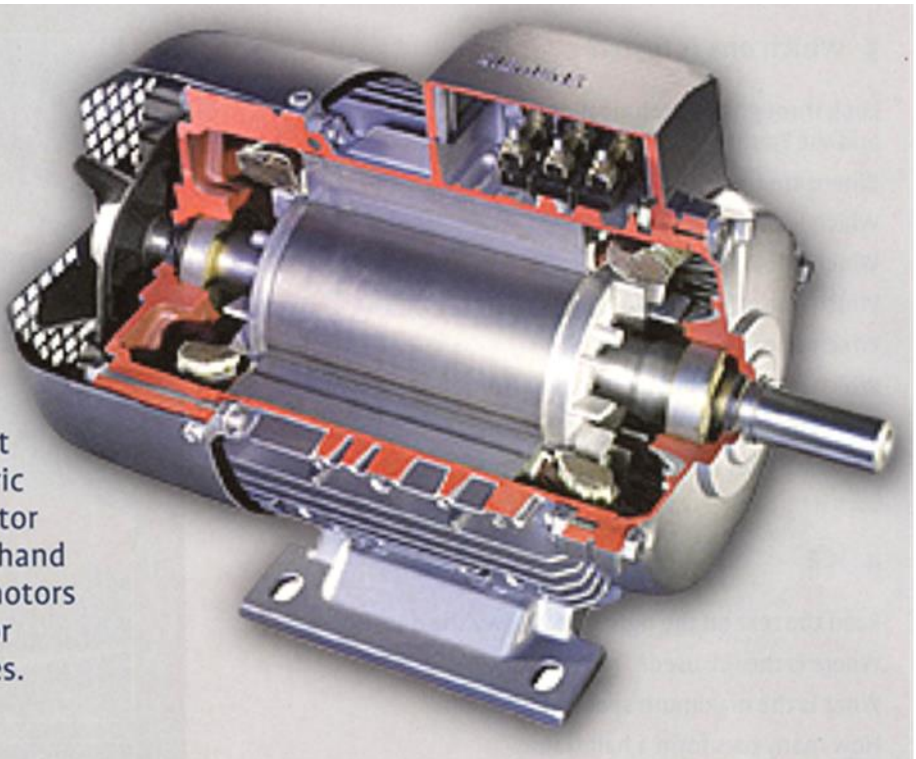
	every month
	once a year
	never

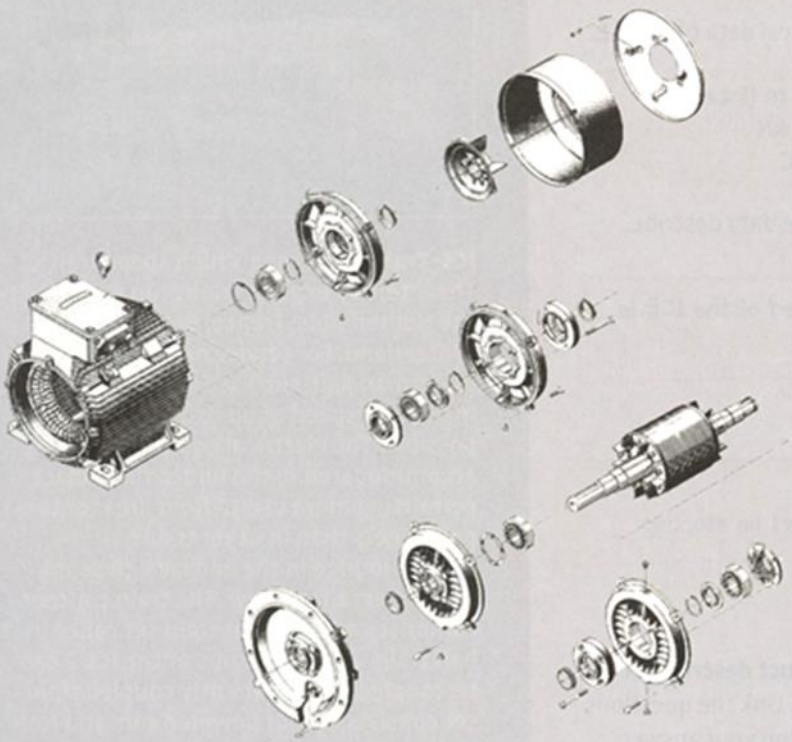
IV) UNIT FOUR: **SQUIRREL CAGE**

Deutsch:	Käfigläufer / Asynchronmotor
English:	squirrel cage / Asynchronous motor
Slovenský:	klietkový rotor

Quellenverweis:
Der folgende Lesetext und die Arbeitsaufgaben dieser Lerneinheit wurden dem Lehrbuch „Talking Networks" Unit 32 B mit freundlicher Genehmigung des Verlages Hölder-Pichler-Tempsky, Wien entnommen. www.hpt.at (Unit adapted)

A squirrel-cage rotor is the rotating part in three-phase AC induction motors, or asynchronous motors, the world's best and most commonly used electric motors. About half the world's electric energy is used for motor operation, from your hand tools to the mighty motors driving locomotives or entire production lines.





Connected to a three-phase voltage the field windings in the stator of a three-phase induction motor set up a rotating magnetic field around the rotor. The rotating field cuts the conductors in the rotor and induces an electromagnetic force (emf). The emf causes currents to flow in the cage. The resulting magnetic flux reacts with the stator field and produces force to turn the rotor (torque).
In effect the rotor is carried around with the magnetic field in the stator but at a slightly slower rate of rotation. The speed is asynchronous, hence asynchronous motor. The difference in speed is called "slip" and causes the emf to be induced in the rotor.

Motor parts

bearings
hold the ends of the shaft, easing rotation

case
protective covering with a **shield** (cover) at each end

fan
creates a current of air for cooling

rotor
rotating part of an electric motor: a stack of iron laminations held together by the squirrel cage, and mounted on a shaft

shaft
rotating centre of a motor carrying the rotor

squirrel cage
conductive bars of aluminium or copper set into the rotor grooves and connected at both ends, forming a cage-like shape

stator
stationary part of a machine holding the windings

terminal box
where the wiring is connected

windings
coils in the stator that create a magnetic field

VOCABULARY:
WORK IN PAIRS:

German	Slovak

1 Motor *parts*

Look at the **illustrations** on the opposite page and study the **parts list**.

What are the parts called in English?
Write the words next to the appropriate parts in the drawings.
Which of the parts are unique to a squirrel-cage motor?
Discuss your results with a partner.

2 Looks like *a cage*

Look at the illustration on the opposite page and listen to Andreas and Tina.
Tick the **parts** they mention.
Listen again and tick the appropriate statements.

Asynchronous motors	○ are cheap. ☐ ○ are almost maintenance-free. ☐ ○ are constructed very simply. ☐ ○ require a high starting current. ☐ ○ produce a low starting torque. ☐
There aren't any	○ external rotor connections. ☐ ○ slip-rings to service. ☐ ○ brushes to replace. ☐

Read your results to a partner.
Then work out with him or her which of the statements describe an **advantage (A)** or a **disadvantage (D)**?
Mark them in the list.

3 First *you connect ...*

Look at the **text** about three-phase induction motors on the opposite page and listen to Andreas and Tina.
Number the functional steps in sequence.

☐	The field windings generate a rotating field around the ☐
☐	Connect the stator windings to a three-phase voltage.
☐	The rotating field induces an emf in the rotor cage.
☐	The rotor turns at a lower speed than the stator field.
☐	The difference in speed is called ☐
☐	The magnetic field carries the rotor practically around with it.

4 The *stator windings*

Refer to the drawings and the illustration and explain the **construction** of a squirrel-cage motor to a partner.
Describe how it works and tell him or her about the advantages and disadvantages.