

Continuing Professional Development
in Vocational Education and Training

Sand Casting

Inspiration for online teaching





In the COVET project, we have collected many great examples of teaching that have been transformed from the classic off-line version into a modern online learning method.

These sample lessons have been created by VET teachers from different EU countries. We present them to you as inspiration for your work.

The lessons are particularly suitable for vocational teachers, but can also serve as a training tool for teachers, trainers and lecturers in other educational settings.

All sample lessons, training materials as well as all information about the project are available at:

<https://www.covet-project.eu/>

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Sand Casting

Off-line version of the preparation:

Goal: Students will be reminded of the concepts of standardized and non-standardized semi-finished products. They will learn new terms related to sand mould casting. They will be able to describe in their own words the process of making castings in sand moulds. They will be able to sequence this process into a simplified flow chart.

Teaching methods:

Problem-based interview, demonstration of teaching aids, and other methods depending on how the lesson is going

Teaching Aids:

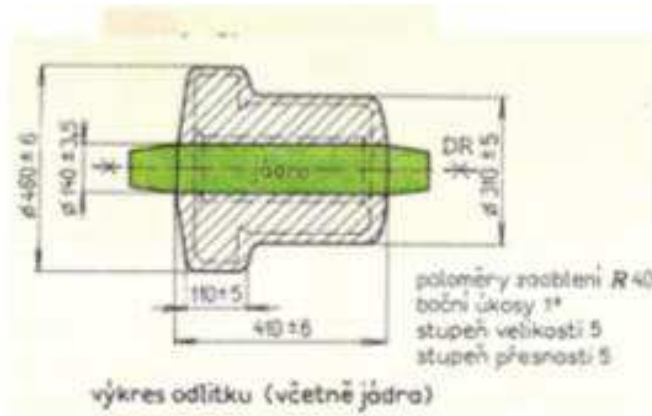
- **Presentation of the sand casting process** in form of a PPT presentation. Prepared practicing slides with definitions and processes.
- A wooden model, ceramic cores, a ceramic inlet system and ceramic filters, a cast.
- *Learning sheets* summarizing the presented topic. They will only be given these after the lesson is over.

The course of activities during the lesson:

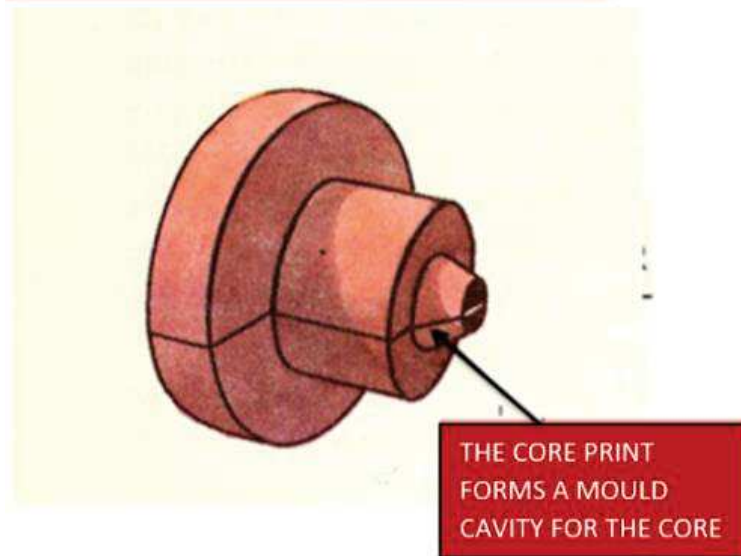
- Repeating terms of standardized and non-standardized semi-finished products and what fits into these above-mentioned categories. **This will be done by asking the students seated at their desks – each will get one of the semi-finished products from the given group etc. – all this depending on the immediate situation.**
- Analysis of a drawing of a part and discussing how to make a **casting drawing** based on that: The terms **machining allowance, metal shrinking allowance, chamfers, radii, core - illustrations provided in a PPT presentation**
- Using the PPT presentation we discuss the process of production of castings in sand moulds. If available, we introduce the relevant terms using 3D aids.
Concepts: Core box, model, core lock, inlet system, exhaustion system, sprue, steel frame, loading weight.
- Each of the seated students repeat the process of production of casts in sand moulds. Then all the students draw a flow chart into their notebooks according to the pictures of the process in the PPT presentation. We correct the mistakes together.
- We hand out learning sheets for the entire foundry topic.
- We discuss how the lesson went.
- This technical topic is introducing the students to the very essential part of metal-working and although they may not do any sand-casting in practice, it is essential for understanding of basic principles of the process. Understanding and following set processes is very important in any technical profession.

A sample of several slides from the PPT presentation:

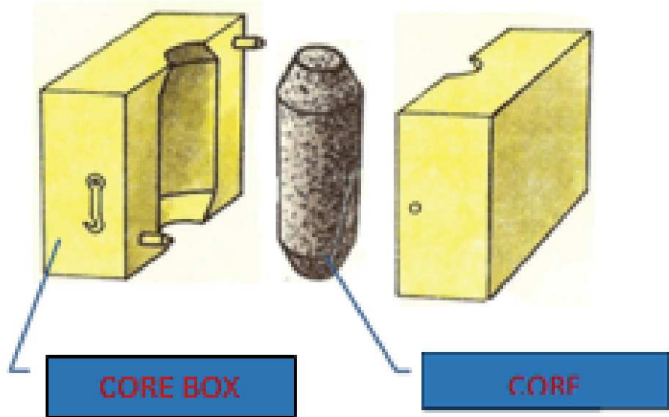
CASTING DRAWING



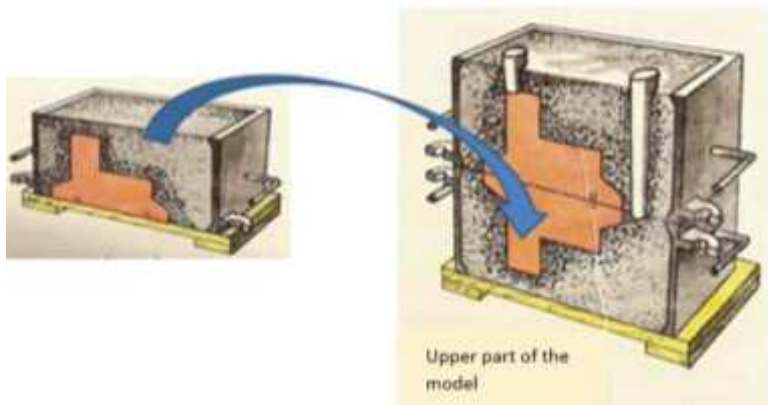
MODEL



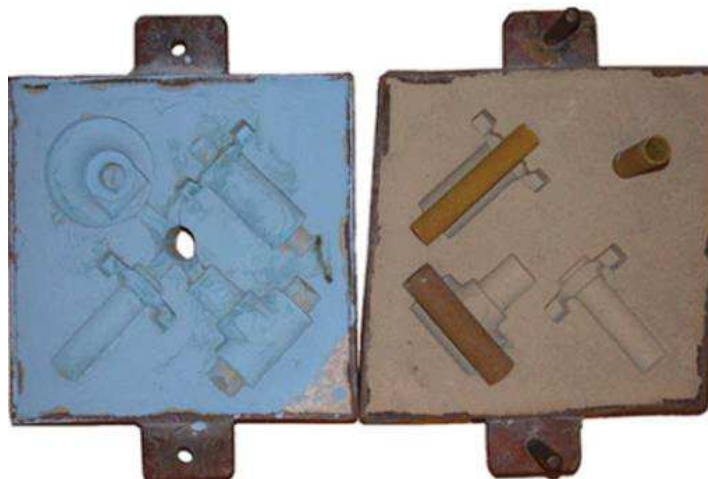
Casting a core in a core box



MODEL CASTING



Mould with cores and inlet system



Online version of the preparation

At the very beginning of the COVID-forced online learning, we only had available school emails of the students and the only possibility was to send them assignments via the Bachelor school administration programme. I managed to set up a **Messenger group** with all my classes. (Thanks to that, we were connected even during internet outages, which was a common failure for home connections during the school closures.)

Within a very short period of time, the opportunity to activate and explain the topic to the students in a targeted and individual way by demonstration on the aids was not available anymore... the PPT presentation was almost useless without teacher's explanation.

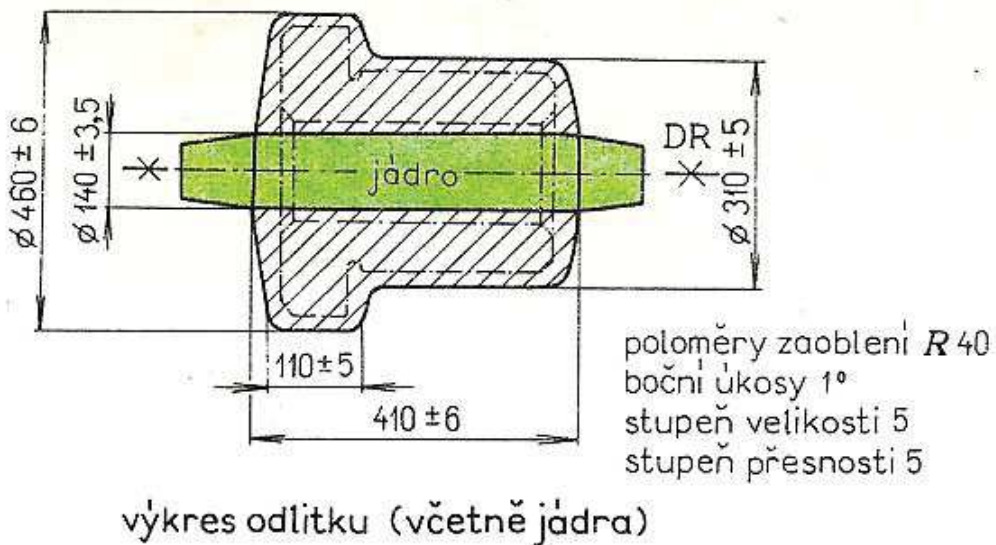
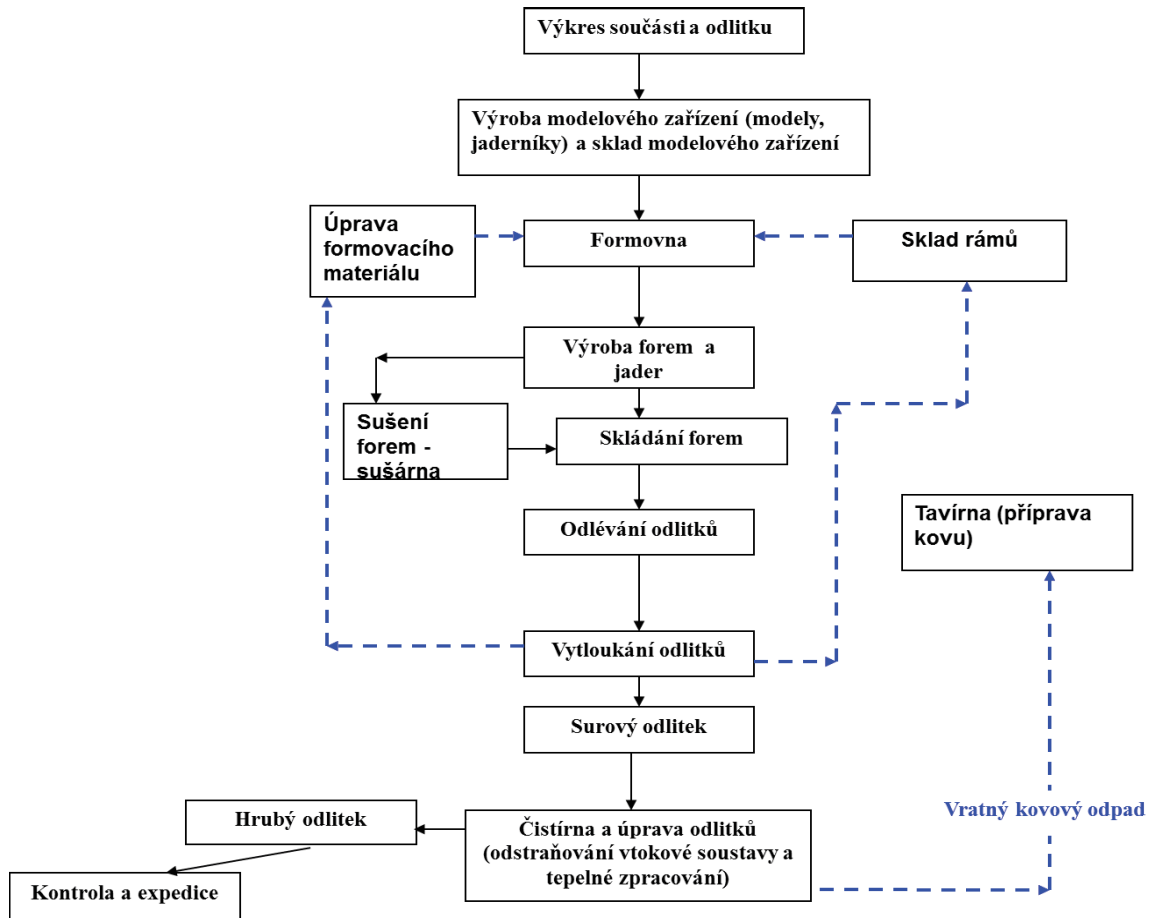
The pupils were sent a modified learning sheet, with **added links to videos** that partly replaced my explanation.

In order to make them read and study the classroom material, I also sent them a **worksheet where they had to fill in answers. They were required to make a photo or a scan of the completed worksheet and send it to me in order to check it.**

For the students it was very difficult to read and fill in worksheets they only had available on their smartphones. For me it was very difficult to work with smartphone scanned images, so I found three apps for scanning mobile phone images into PDF format. **Both I and the students had to learn how to use them.**

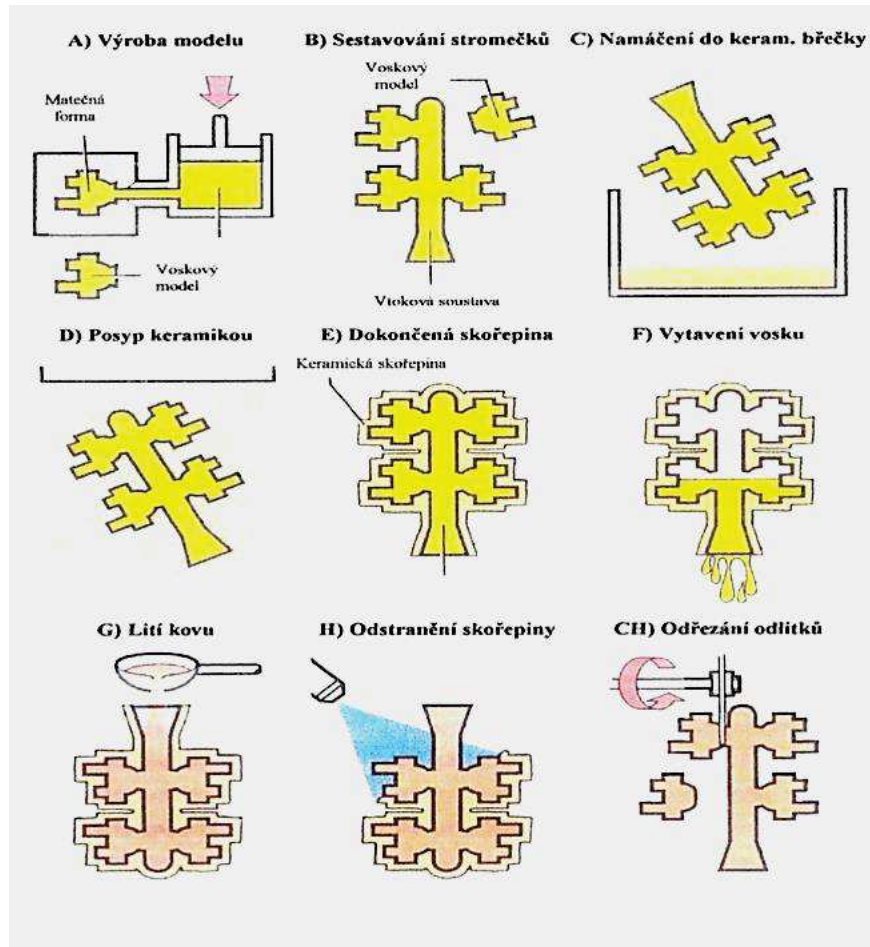
Example of a classroom material with links to videos, the notes are written down by students:

CASTING



LOST WAX CASTING

The entire process of production of precise castings may be divided into following operations:

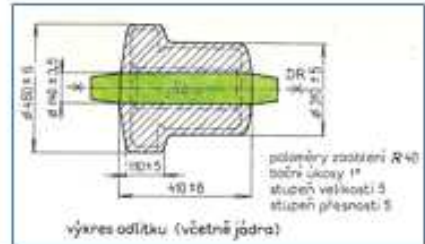


1. Production of wax model molds
2. Production of wax models
3. Completion of wax models
4. Building of wax trees
5. Production of ceramic molds
6. Preparation of molds for casting
7. Casting
8. Finishing operationa

Excerpt from the worksheet based on the above written material:

SAND CASTING

1) Write down all allowances and adjustments that have to be taken into account when making a casting drawing:



2) What is the sequence of operations in production of castings in sand molds?

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3) What is the core box for?

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4) What do we use to make an intended cavity in the casting?

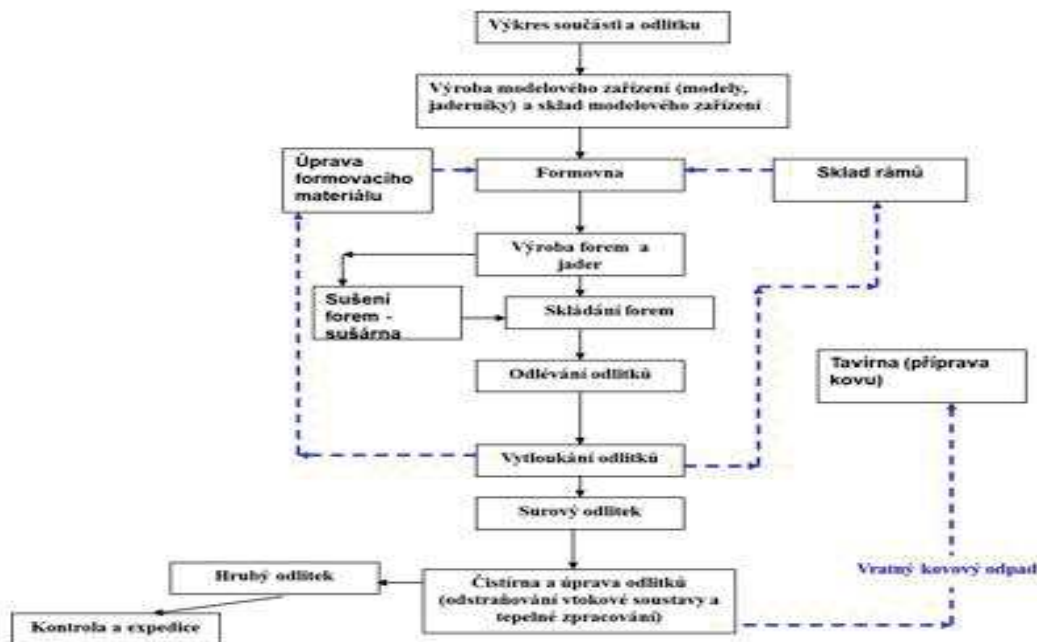
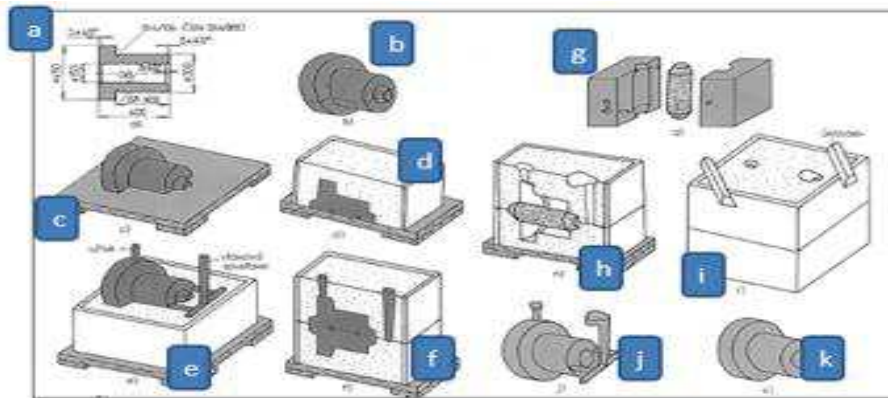
.....

5) Why do we load weight on the top of the form?

.....

6) What are feeding heads for?

.....



The course of teaching has therefore changed as follows:

- Sending learning sheets **with links to videos**.
- Sending worksheets to the pupils and having the pupils complete the worksheets. Most of them **could not print these out** so they had to work with the electronic version.
- Scanning the completed worksheet. We had to use **special scanning applications** for that. I found several applications, and chose those suitable for me and my students.
- Checking the worksheet by the teacher and **sending feedback to each of the pupils individually**.

A great relief came with the next phase, which came quite quickly in our school, namely the **launch and access to the Teams app** for all teachers and students.

I also managed to get myself a free two-month loan of the **iTrivio e-learning application** within three days.

I have written about the experience of using this application, and LMS systems in general, in another sample lesson plan. It basically enabled me to present the students with chunked learning content, provide them with quizzes for each topic section and most of all provide them with an immediate feedback on their knowledge. I created a system of mock and real quizzes enabling the students to monitor their progress. It gave them a sense of being part of a meaningful activity.

Feedback on the lesson

Even though we had a rough start, we managed to find our way. The problem was quality of internet connection as well as quality and software in smartphones used by the students. Fortunately they could watch the attached videos at time that suited them and the same applied to completion of their worksheets.



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