



Meldal  
videregående  
skole

Lake Balaton 3 – 7 juni 2024

Basic training in CNC-milling

**CU1 – CU2**

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## Program for presentation and exercises at Lake Balaton

Title: Flipped work-based learning in CNC milling machine.

### Part 1:

- Background for what we have done.
- Candidates qualifying prior knowledge.
- How does the candidate first become familiar with the content.
- Presentation of the course material on digital platforms (ItsLearning)

### Part 2:

- Candidates familiarize themselves with the equipment and the process.
- How does the candidate start with practical training?
- Practice tasks and tests on the digital learning platform (ItsLearning).

### Part 3:

- Candidates' self-assessment.
- Instructors' assessment.
- Basic platform for further training

# But first of all.... who are we?

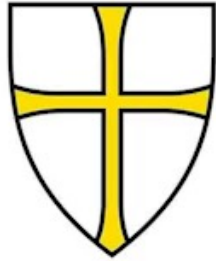
Lars Mikkelsen: Team leader. Economic, HR and didactic responsabel

- 18 teachers, 3 courses, 2 levels
- Teknical background
- 29 years of educational practice
- Facilitator
  
- Terje Grandetrø
- Background
- 24 years of educational practice
  
- Helge J Løseth
- Background
- 15 years of educatinoal practice



# Meldal vgs -> Organisation structure





**Meldal**  
videregående  
skole



Vi utdanner morgendagens fagarbeidere

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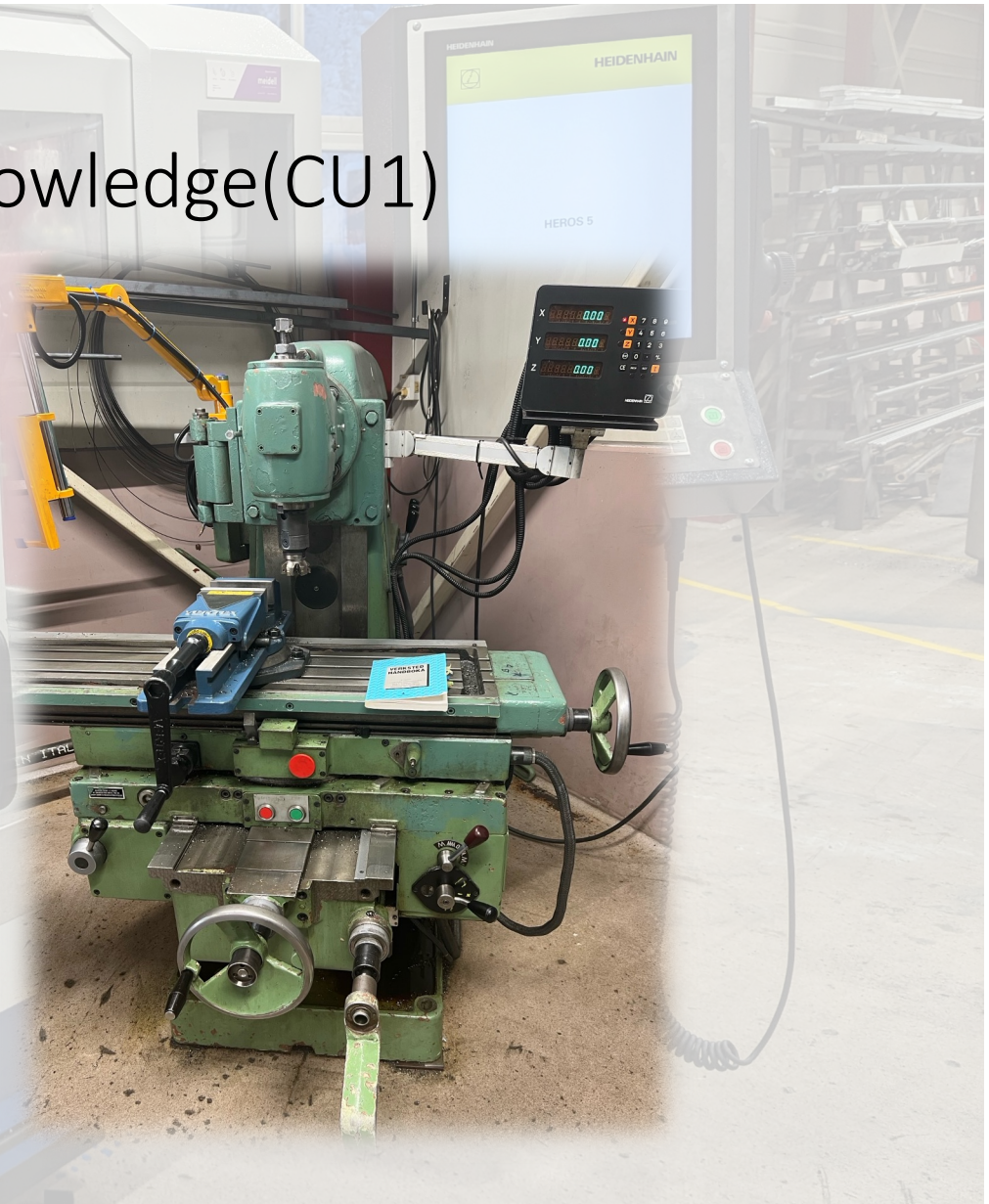
## Our background for the project

- To achieve better basic training in CNC- machining
- Meeting the competence requirements of local businesses
- Modulebased training



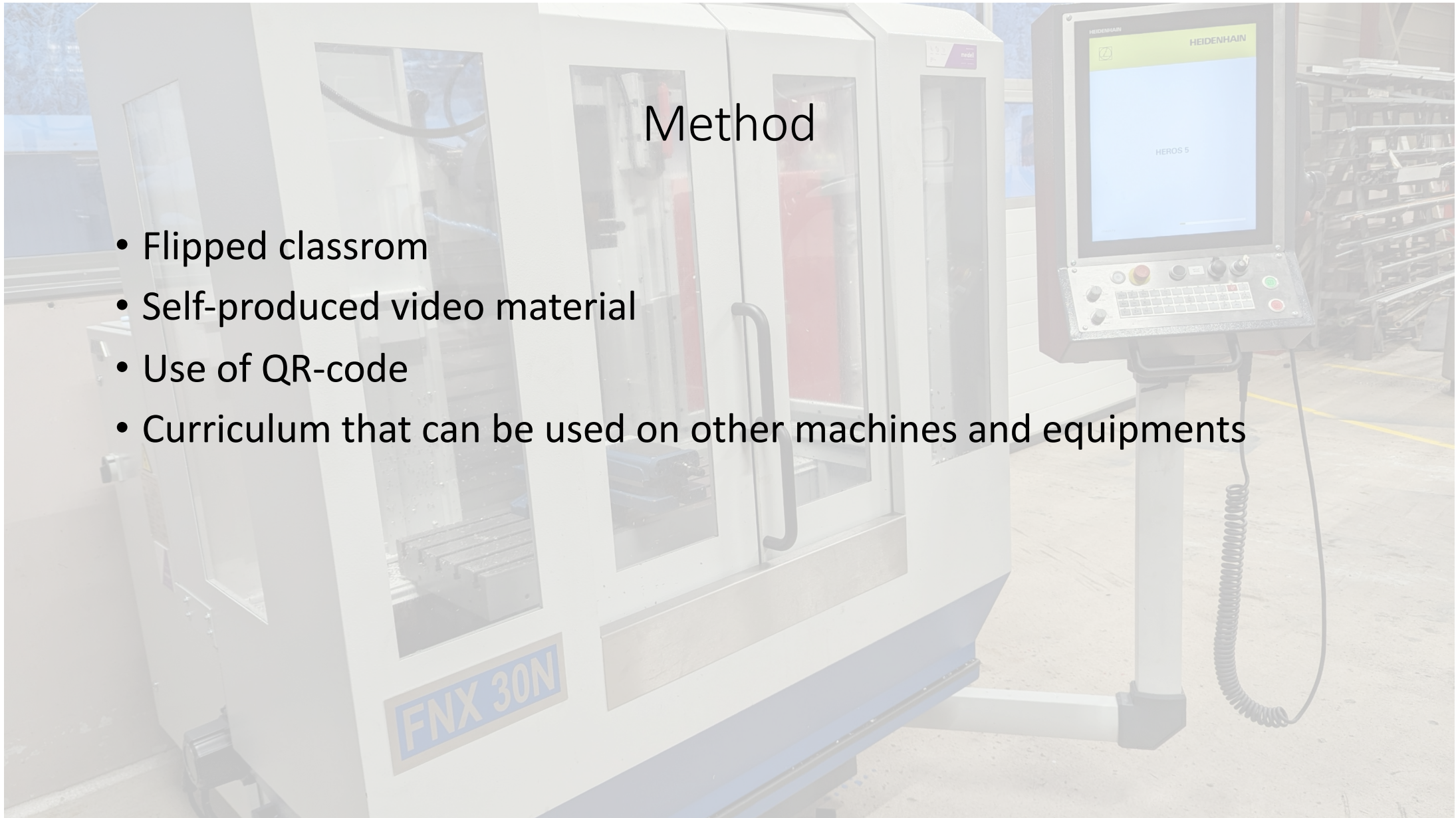
## Qualifying prior knowledge(CU1)

- Be able to operate manual milling machines
- Knowledge of the machine's working directions (X-Y-Z)
- Tool knowledge
- Material knowledge



## Method

- Flipped classrom
- Self-produced video material
- Use of QR-code
- Curriculum that can be used on other machines and equipments





CU2

FNX 30N

**VERKSTADSHÄNDBOKEN**

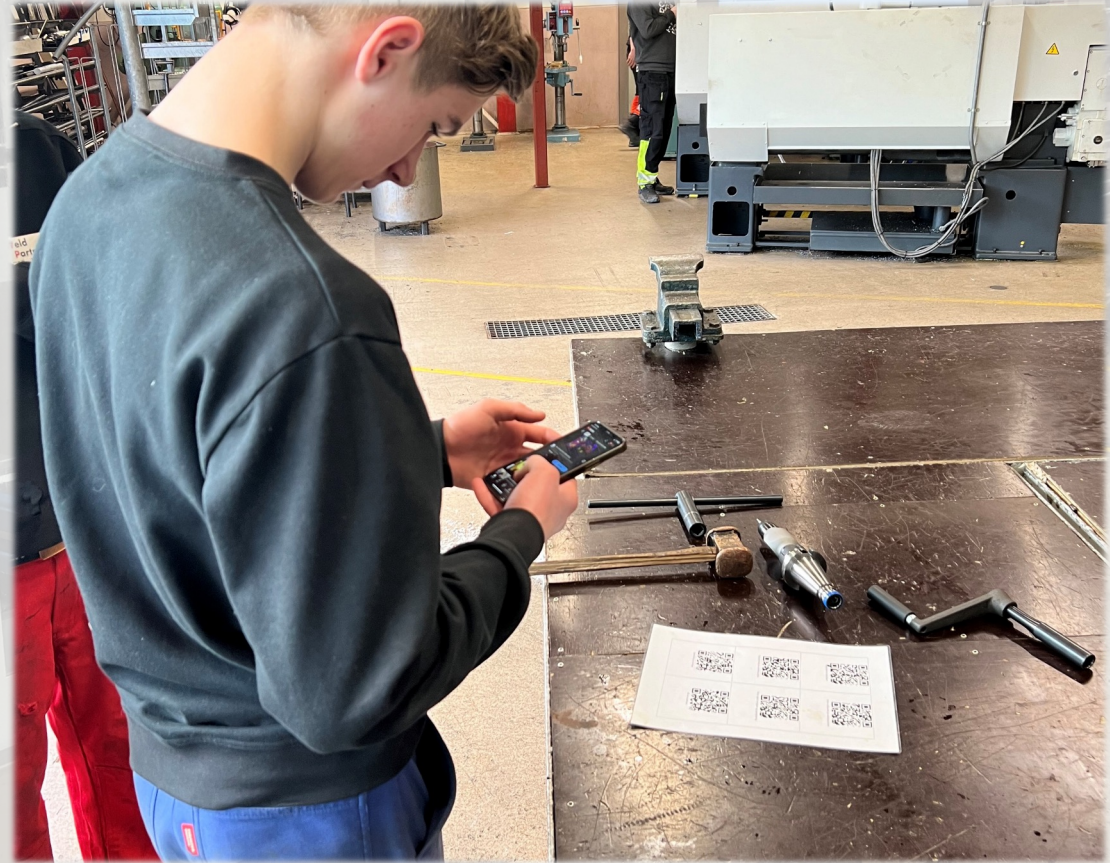
Fräsning	5
Svarvning	23
Slipning	39
Borrning/hålbearbetning	65
Gångor och gängning	75
Sågning	101
CNC-teknik	105
Svetsning och skarvning	121
Lösnings	157
Plåtteknik	163
Ritsteknik	183
Mätning	189
Toleranser och ythjämnhet	199
Pneumatik och hydraulik	241
Material	251
Maskinelement	295
Tabeller och elteknik	323
Engelsk-Svensk ordlista	347
Alfabetiskt register	358

## CU2

QR code is scanned, and the video appears on the phone



4. Setting the zero point  
of the workpiece



CU2

The candidates are studying  
the videos



# Self-study of video material(CU2)

- Flipped classrom
- The candidates study the videos before practical training



 1. Start-up of the machine	 4. Setting the zero point of the workpiece
 2. Clamping of the workpiece	 5. Finding the saved program and commissioning
 3. Measurement of tools	 6. Switching of the machine



A photograph of a white CNC milling machine with a glass-enclosed door. The machine has a blue label that reads "FNX 30N". To the right of the machine is a Heidenhain control panel on a stand. The panel features a large touchscreen displaying the Heidenhain logo and the text "HEROS 5". Below the screen are several physical buttons and a keypad. The background shows a factory floor with metal racks.

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Basic training in CNC-milling

**CU3 - CU4**

## Initial review (CU3)

- Theoretical review of the process
- Demonstrating on the machine



# Practical implementation with support of videomaterials (CU4)

Start-up of the machine

- The candidate goes through the start-up procedure
- Support from the video
- Instructor observes



1. Start-up of the machine



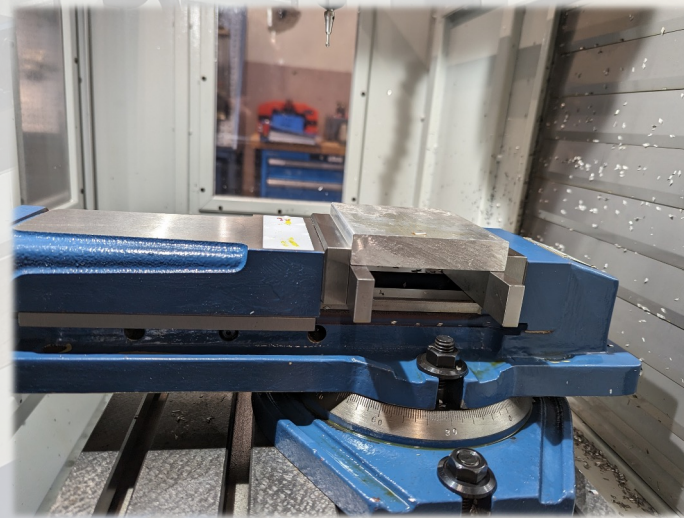
# Practical implementation with support of videomaterials (CU4)

## Clamping of the workpiece

- The candidate learns the clamping procedures
- Support from the video
- Instructor observes



2. Clamping of the workpiece

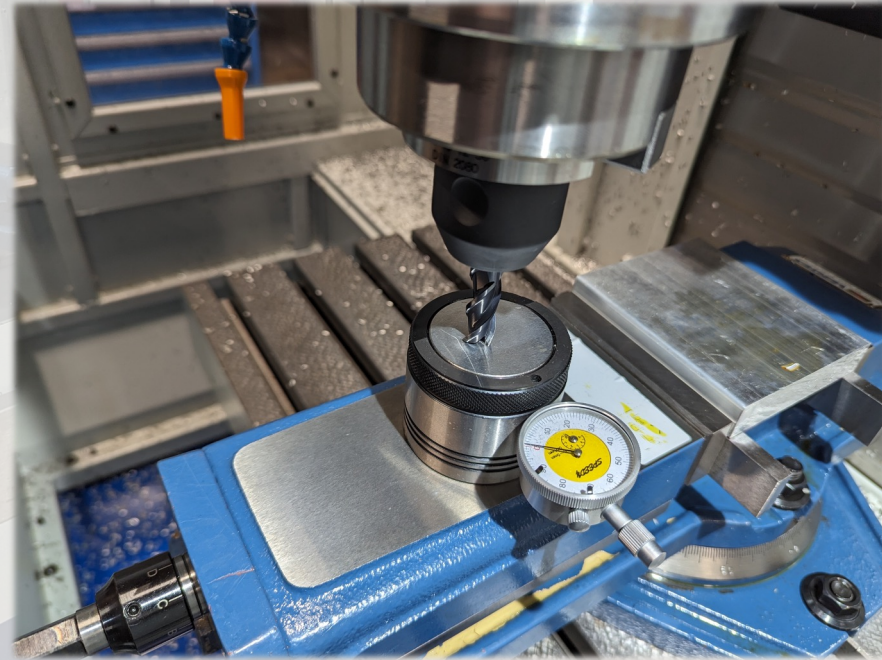
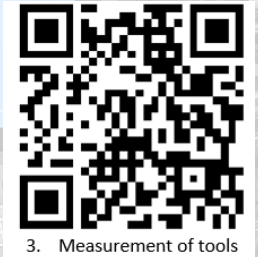




# Practical implementation with support of videomaterials (CU4)

## Measurement of tools

- The candidate learns measurements of the tools
- Support from the video
- Instructor observes



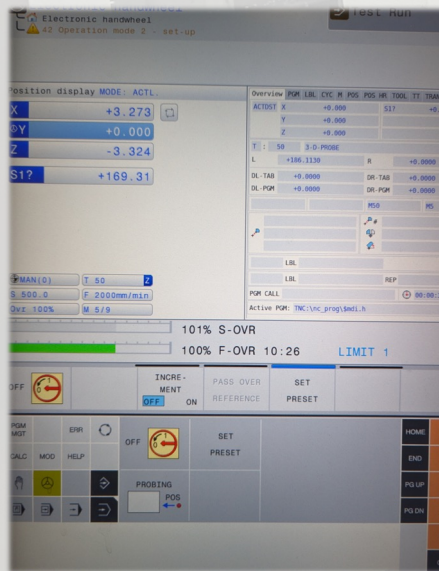
# Practical implementation with support of videomaterials (CU4)

## Setting the zero point on the workpiece

- The candidate set the zero point on the workpiece
- Support from the video
- Instructor observes



4. Setting the zero point of the workpiece



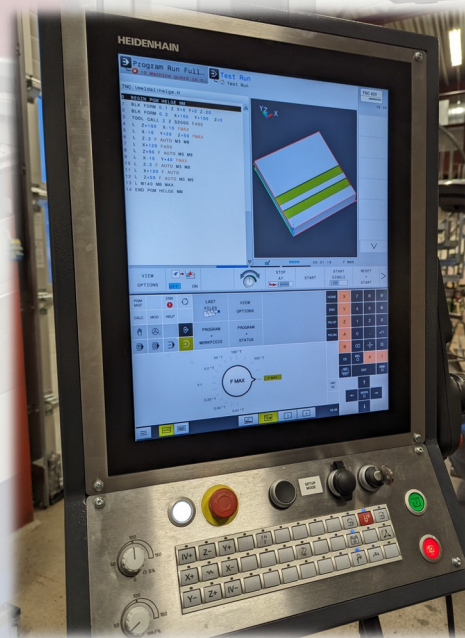
# Practical implementation with support of videomaterials (CU4)

Finding the saved programme and commissioning

- The candidate navigate to the stored programme
- The candidate run the programme
- Support from the video
- Instructor observes



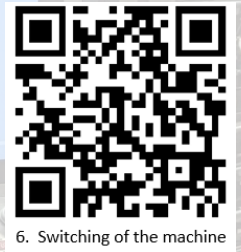
5. Finding the saved program  
and commissioning



# Practical implementation with support of videomaterials (CU4)


Switching off the machine

- The candidate switching off the machine
- Support from the video
- Instructor observes



6. Switching of the machine

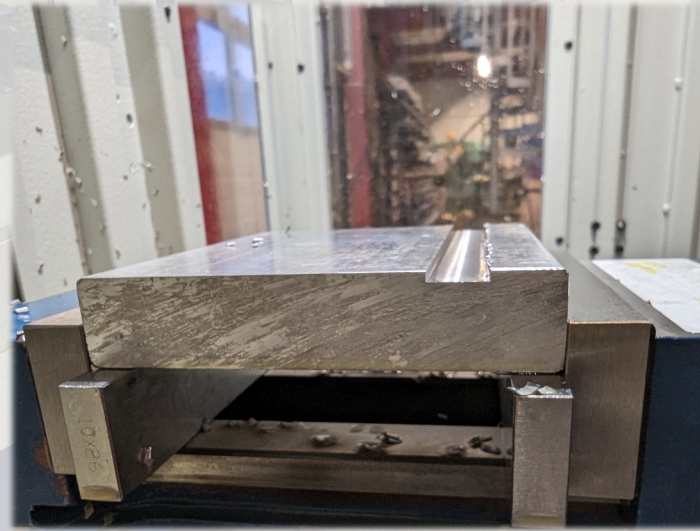


A photograph of a white CNC milling machine with a glass-enclosed door. The machine has a blue label that reads "FNX 30N". To the right of the machine is a Heidenhain control panel on a stand. The panel features a large touchscreen displaying the "HEIDENHAIN" logo and "HEROS 5" text, along with a keyboard and several buttons. The background shows a factory floor with metal racks.

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**Basic training in CNC-milling**  
**CU5 – CU6**

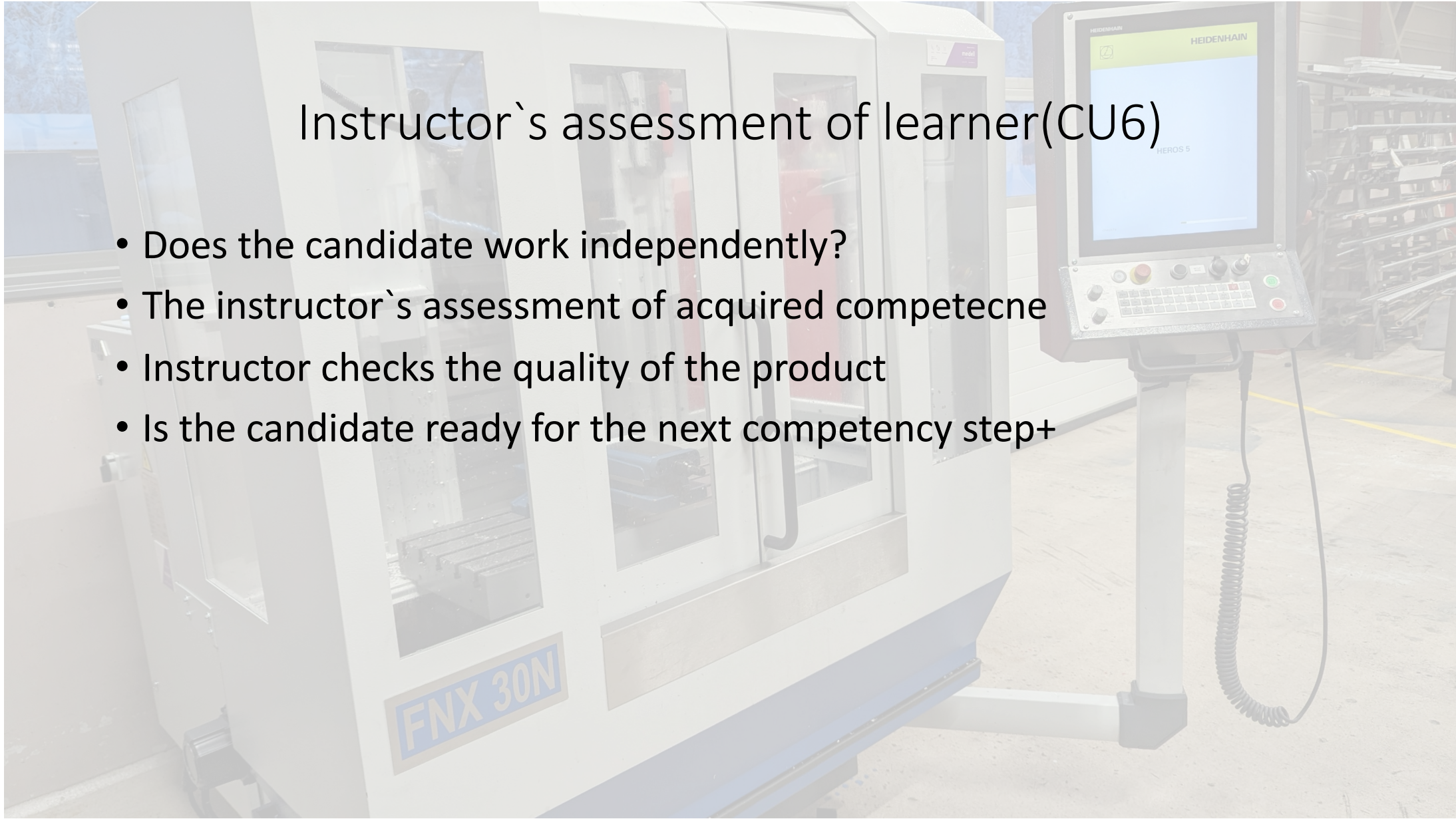
## Self-assessment by learner (CU5)

- The candidate reflect of what he/she has learnt in the process
- The candidate checks if the result is as expected
- Involves the use of differnt measuring tools
- Feedback to the instructor



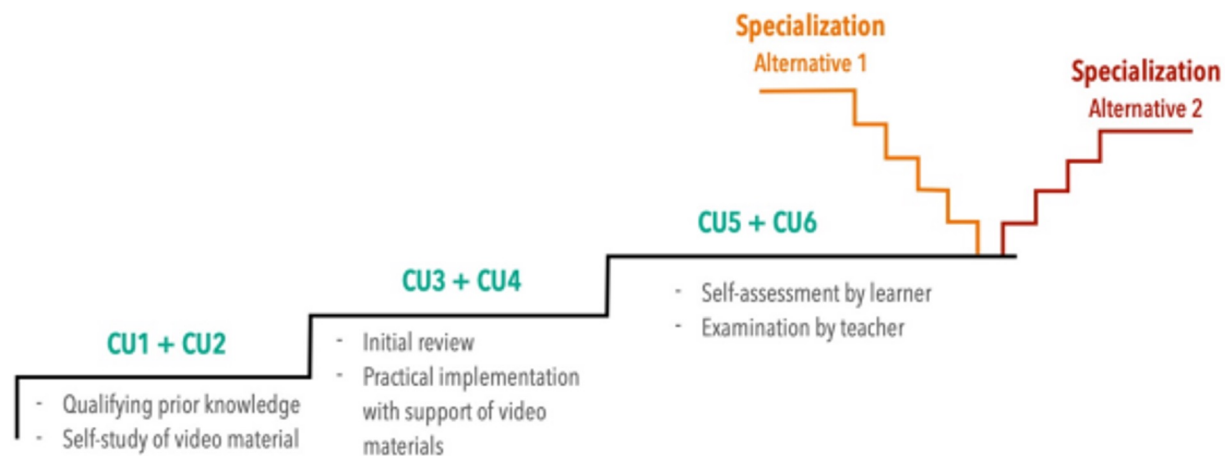
## Instructor`s assessment of learner(CU6)

- Does the candidate work independently?
- The instructor`s assessment of acquired competecne
- Instructor checks the quality of the product
- Is the candidate ready for the next competency step+



# Learnings outcomes

- Transition between manual and computer-controlled machines
- Basic education for further training





# Thank you for your attention



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