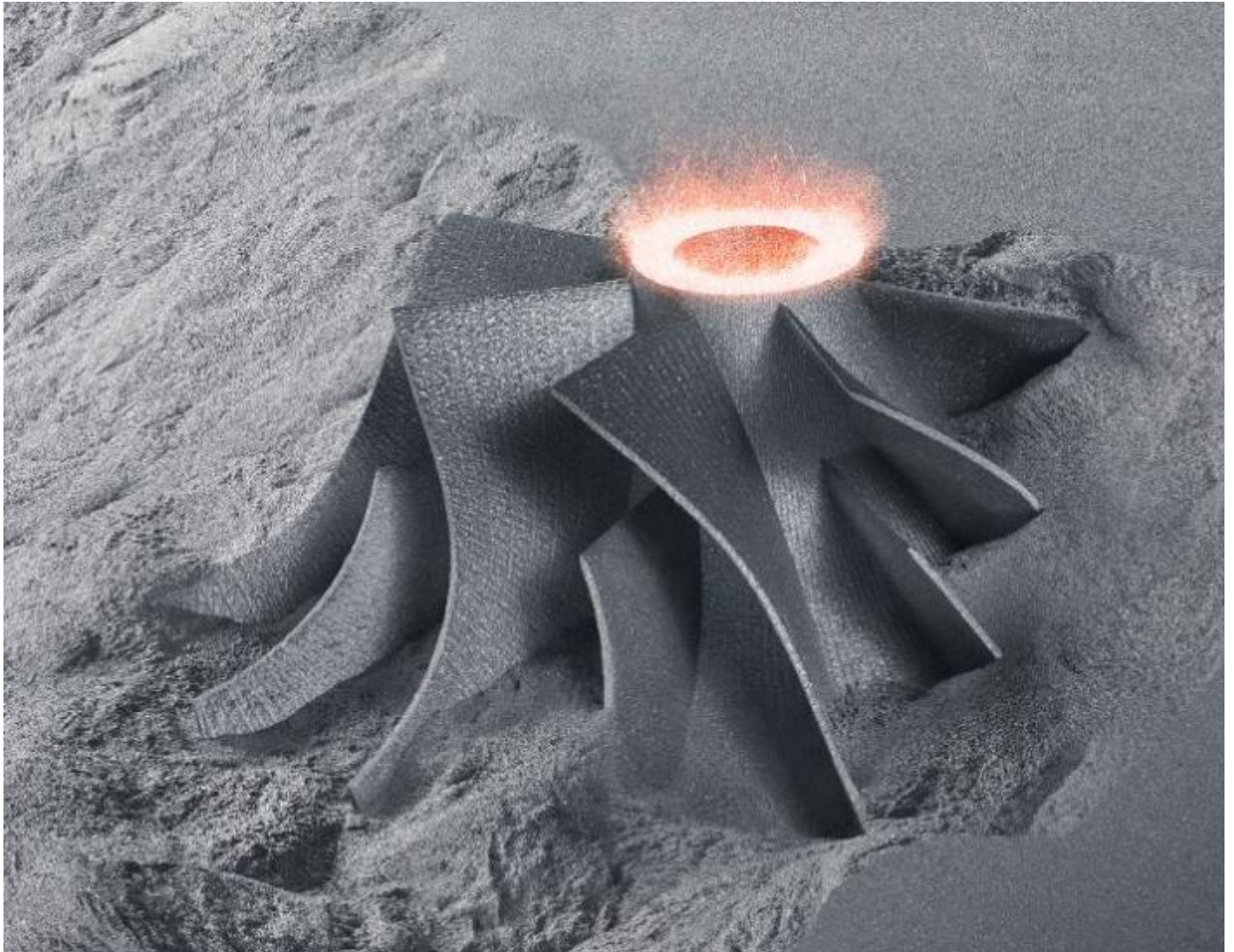


Welcome to MH2100!



Purpose

The aim of the course is to provide the students with knowledge about the field of powder metallurgy and to teach the students generic principles associated with creating powders and fabricating engineering shapes from those powders.

Intended learning outcomes

At the end of the course, the participants should demonstrate the ability to:

- Summarize and explain the different process steps characteristic for powder-based materials in general and for materials/processes of special interest for Swedish PM industry in particular.
- Explain and apply different methods for fabrication and characterization of powder.
- Explain different methods for compaction, pressing and forming of metal powder.
- Compare different methods of free-form fabrication in general and powder-based additive manufacturing in particular.

- Explain and apply the physical background of sintering in general and to sintering of cemented carbides in sintered steels in particular.




Schedule

Activity	Date	Time	Location	Theme
Lecture 1 (https://canvas.kth.se/courses/20026/pages/lecture-1-introduction-and-powder-production?module_item_id=270884)	Oct. 25	15.15- 17.00	Online _(https://kth-se.zoom.us/j/65620919339)	Introdu fabrica
Exercise 1 (https://canvas.kth.se/courses/20026/pages/exercise-1-powder-production?module_item_id=270891)	Oct. 29	10.15- 12.00	B21	Powde
Lecture 2 (https://canvas.kth.se/courses/20026/pages/lecture-2-powder-characterization?module_item_id=270885)	Nov. 2	15.15- 17.00	Online _(https://kth-se.zoom.us/j/65620919339)	Powde
Exercise 2 (https://canvas.kth.se/courses/20026/pages/exercise-2-powder-characterization)	Nov. 5	10.15- 12.00	B21 (possibly online)	Powde
Lecture 3 (https://canvas.kth.se/courses/20026/pages/lecture-3-shaping-compaction-full-density-processes?module_item_id=270886)	Nov. 9	15.15- 17.00	Online _(https://kth-se.zoom.us/j/65620919339)	Shapin full-der
Exercise 3 (https://canvas.kth.se/courses/20026/pages/exercise-3-shaping-compaction-full-density-processes)	Nov. 12	10.15- 12.00	B25	Shapin full-der
Lecture 4 (https://canvas.kth.se/courses/20026/pages/lecture-4-additive-manufacturing?module_item_id=270887)	Nov. 17	15.15- 17.00	Online _(https://kth-se.zoom.us/j/65620919339)	Additiv
Exercise 4 (https://canvas.kth.se/courses/20026/pages/exercise-4-additive-manufacturing)	Nov. 19	10.15- 12.00	Online _(https://kth-se.zoom.us/j/65620919339)	Additiv
Lecture 5 (https://canvas.kth.se/courses/20026/pages/lecture-5-sintering?module_item_id=270889)	Nov. 23	15.15- 17.00	Online _(https://kth-se.zoom.us/j/65620919339)	Sinterir
Exercise 5 (https://canvas.kth.se/courses/20026/pages/exercise-5-sintering?module_item_id=270897)	Nov. 26	10.15- 12.00	B25	Sinterir

Lab 1 (https://canvas.kth.se/courses/20026/pages/lab-1-powder-characterization)	Nov. 30	09.00- 17.00	Swerim, Kista	Powde
Exercise 6 (https://canvas.kth.se/courses/20026/pages/exercise-6-powder-characterization-lab-summary?module_item_id=270899)	Dec. 3	10.15- 12.00	Online _(https://kth-se.zoom.us/j/65620919339)	Powde
Lecture 6 (https://canvas.kth.se/courses/20026/pages/lecture-6-recap-questions-and-discussion?module_item_id=270890)	Dec. 7	15.15- 17.00	Online _(https://kth-se.zoom.us/j/65620919339)	Recap, discuss
Lab 2 (https://canvas.kth.se/courses/20026/pages/lab-3-sintered-steels)	Dec. 8	13.15- 17.00	Blå	Sintere
Lab 3 (https://canvas.kth.se/courses/20026/pages/lab-3-cemented-carbides?module_item_id=270902)	Dec. 10	09.15- 12.00	Blå	Cemen
Exam	Jan. 14	14.00- 18.00	Digital	



Course literature

- Powder Metallurgy & Particulate Materials Processing (2005) by B. German (ISBN: 0-97620571-8)
- Additive Manufacturing Technologies by I. Gibson et al. (ISBN: 978-1-4939-2113-3 (eBook))
- PM Compendium by B. Uhrenius: [Uhrenius - Powder Metallurgy.pdf](https://canvas.kth.se/courses/20026/files/3448123/download?wrap=1)
(<https://canvas.kth.se/courses/20026/files/3448123/download?wrap=1>) 
(<https://canvas.kth.se/courses/20026/files/3448123/download?wrap=1>)
- Handouts + collection of exercises

Examination

The examination consists of one written exam, TEN3, and three lab. sessions, LAB2. To pass (P) the LAB2, presences at all three lab. session is required and completed and approved reports. The final grade is determined by the grade obtained on TEN2.

For passing the complete course, it is required that the student obtains grade E on the written exam within all five ILOs. For a higher grade, the student is required to show a deeper understanding of, and ability to apply, attained knowledge within some, up to all, ILOs.

Grade criteria

For the different grades for TEN2 it is required that the student

FX meet the E criteria within two ILOs.

E be able to summaries and describe the content within each ILO; i.e., participated in all three lab sessions and completed approved reports, and passed the A-part of the written exam.

D meet the E criteria and can apply the attained knowledge within one part of the course demonstrated through passing one of the examination questions in the B-part of the written exam.

C meet the D criteria and can apply attained knowledge and solve advanced exercises for a number of parts of the course included in the B-part of the written exam.

B meet the C criteria and can apply the attained knowledge and solve advanced exercises for all the parts of the course included in the B-part of the written exam.

A meet the B criteria and can solve problems that combine several parts of the course included in the B-part of the written exam.

Examination details

The exam has two parts, part A and part B. Passing part A is required to reach E-level. Credits on part B is needed to obtain a grade higher than E.

- TEN2 - Examination, 4.0 hp, grading scale: A, B, C, D, E, FX, F
- LAB2 – Lab sessions, 2.0 hp, grading scale: P, F

Examination information

Date: January 14th, 2 pm to 6 pm

Location: Online

Aids: Collection of formulae (provided) and pocket calculator. See below for the collection of formulae: