

KTH Royal Institute of Technology
School of Industrial Engineering and Management
Department of Materials Science and Engineering
Unit of Structure

POWDER METALLURGY (MH2100) 6 credits

Fall 2019

Teachers: Greta Lindwall (gretal@kth.se)

Examiner: Greta Lindwall

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 freeform 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.

Lectures and exercise sessions

The course includes lectures and exercise sessions in total twice a week.

Laboratory work

The course includes three mandatory labs: powder characterization (2/12), cemented carbides (5/12) and sintered steels (12/12).

Eligibility

MH2038 Micro and Nano Structures in Materials.

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))
- Handouts, collection of exercises

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Schedule

Activity	Date, time, location	Content	Literature	Teacher
Lecture 1	28/10, 15-17, L41	Introduction, Powder fabrication	German: Ch. 1-2 BU: Ch. 1-2	Greta
Exercise 1	31/10, 10-12, B22	Powder fabrication	Handouts	Greta
Lecture 2	4/11, 15-17, L41	Powder characterization	German: Ch. 2, 4 BU: Ch. 1-2	Greta
Exercise 2	7/11, 10-12, B23	Powder characterization	Handouts	Greta
Lecture 3	12/11, 15-17, L43	Shaping, compaction, full-density processes	German: Ch. 5-7, 10	Greta
Exercise 3	14/11, 10-12, B23	Shaping, compaction, full-density processes	Handouts	Greta
Lecture 4	18/11, 15-17, L44	Additive manufacturing – techniques and design	Gibson: Ch. 1, 3 (3.2, 3.4, 3.7) and 5 (5.1, 5.2.2.2, 5.3, 5.5, 5.6.2, 5.6.3)	Greta
Lecture 5/Exercise 4	21/11, 10-12, M41	Additive manufacturing – powder and materials	Gibson: Ch. 1, 3 (3.2, 3.4, 3.7) and 5 (5.1, 5.2.2.2, 5.3, 5.5, 5.6.2, 5.6.3)	Greta
Lecture 6	25/11, 15-17, L44	Sintering	German: Ch. 8, 9	Greta
Exercise 5	28/11, 10-12, L43	Sintering	Handouts	Greta
Lab 1	2/12, Swerim in Kista	Powder characterization	Handouts	Greta and Pelle Melin (Swerim)
Exercise 6	5/12, 10-12, B41	Powder characterization		Greta
Lab 2	5/12, 9-13, Coromant i Västberga	Cemented carbides	Handouts German: Ch.	Greta and Anderas Blomqvist (andvik Coromant)
Lecture 7	9/12, 15-17, L43	Recap, questions and discussion	All above	Greta
Lab 3	12/12, 10-12, Blå	Sintered steels	Handouts	Greta and Marja Haglund (Höganäs)
Exam	8/1, 14-18, Q11/V01			