



Satuan Acara Pengajaran

ENMT801016 - Rekayasa Permukaan Material Lanjut

Pengajar

Nofrijon Bin Imam Sofyan Ph.D

Minggu 1

Materi Class Introduction
General Rules
Grading
Class Outline
Team Work Problem-Based Learning Simulation

Media LCD Projector

Referensi Karl-Erik Thelning, ?Steel and its heat treatment,? Butterworths, 1984. ASM Handbook Vol. 4; Heat Treating, ASM International, Ohio, USA, 1991. ASM Handbook Vol. 5; Surface Engineering, ASM International, Ohio, USA, 1994.
Rointan F. Bunshah: Handbook of Hard Coatings, Deposition Technologies, Properties and Applications, Noyes Publications, Park Ridge, New Jersey, 2001.
Hugh O. Pierson: Handbook of Chemical Vapor Deposition (CVD) Principles, Technology, and Applications, Noyes Publications, Park Ridge, New Jersey, 1999.
Arthur A. Tracton: Coatings Technology Handbook, CRC Press Taylor & Francis Group, Boca Raton, 2006.

Aktivitas Lecture
Problem-Based Learning

Minggu 2

Materi Fundamental of Surface Engineering:
- Part Surface Requirements
- Selecting surface technologies
- Processes for surface treatment
- Classification of surface engineering

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Referensi ASM Handbook Vol 4: Heat Treating, ASM International, Ohio, USA, 1991.
ASM Handbook Vol 5: Surface Engineering, ASM International, Ohio, USA, 1994.

Aktivitas Lecture

Minggu 3

Materi Surface Cleaning:
- Factors in selection
- Cleaning options: Mechanical, Chemical, Biological
- Inhibitors

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Referensi Rointan F. Bunshah: Handbook of Hard Coatings, Deposition Technologies, Properties and Applications, Noyes Publications, Park Ridge, New Jersey, 2001.
Hugh O. Pierson: Handbook of Chemical Vapor Deposition (CVD) Principles, Technology, and Applications, Noyes Publications, Park Ridge, New Jersey, 1999.
Arthur A. Tracton: Coatings Technology Handbook, CRC Press Taylor & Francis Group, Boca Raton, 2006.

Aktivitas Lecture

Minggu 4

Materi Team Work Problem-Based Learning
- Material Failure
- Failure Analysis
- Self assessment
- Group Assessment

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Referensi Rointan F. Bunshah: Handbook of Hard Coatings, Deposition Technologies, Properties and Applications, Noyes Publications, Park Ridge, New Jersey, 2001.
Hugh O. Pierson: Handbook of Chemical Vapor Deposition (CVD) Principles, Technology, and Applications, Noyes Publications, Park Ridge, New Jersey, 1999.
Arthur A. Tracton: Coatings Technology Handbook, CRC Press Taylor & Francis Group, Boca Raton, 2006.

Aktivitas Group Discussion
Class Discussion

Minggu 5

Materi Surface Finishing:
- Tolerance, consistency
- Surface quality
- Surface texture
- Surface integrity
- Surface alterations
- Cutting edges finishing
- Non-abrasive finishing

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Referensi ASM Handbook Vol 5: Surface Engineering, ASM International, Ohio, USA, 1994.
Helmi A. Youssef and Hassan El-Hofy: Machining technology: machine tools and operations, CRC Press Taylor & Francis Group, Boca Raton 2008
J.T. Black and Ronald A. Kohser: DeGarmo's Materials and Process in Manufacturing, 10th Ed., John Wiley & Sons, Inc., Hoboken NJ, 2008

Aktivitas Lecture

Minggu 6

Materi Selected Traditional Surface Engineering:
- Painting
- Electroplating
- Anodizing
- Thermal and plasma spraying
- Diffusion: Nitriding, carburizing, boriding
- Selective: Flame and induction

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Referensi ASM Handbook Vol 4: Heat Treating, ASM International, Ohio, USA, 1991.
ASM Handbook Vol 5: Surface Engineering, ASM International, Ohio, USA, 1994.

Aktivitas Lecture

Minggu 7

Materi Midterm

Media

Referensi

Aktivitas

Minggu 8

Materi Enhanced Surface Engineering:
- Laser treatment
- Physical vapor deposition
- Chemical vapor deposition

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Referensi ASM Handbook Vol 4: Heat Treating, ASM International, Ohio, USA, 1991.
ASM Handbook Vol 5: Surface Engineering, ASM International, Ohio, USA, 1994.

Aktivitas Lecture

Minggu 9

Materi Case Study:
Surface Engineering and Their Characterization

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Journal

Referensi Hitoshi Habuka and Masaki Tsuji: Surface & Coatings Technology 217
(2013) 88-93

Aktivitas Independent Learning and Problem Solving

Minggu 10

Materi Physical vapor deposition
- Principle of PVD
- Two classes of PVD: Evaporation and Sputtering
- Processes in PVD

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Referensi 1. ASM Handbook Vol 5: Surface Engineering, ASM International, Ohio, USA, 1994.
2. A.A. Tracton: Coatings Technology Handbook, Taylor & Francis Group, Boca Raton, 2006
3. R. F. Bunshah: Handbook of Deposition Technologies for Films and Coatings Science, Technology and Applications, Noyes Publications, Park Ridge, NJ 1994
4. D. M. Mattox: Handbook of Physical Vapor Deposition (PVD) Processing Film Formation, Adhesion, Surface Preparation and Contamination Control, Noyes Publications, Westwood, NJ 1998

Aktivitas Lecture

Minggu 11

Materi PVD (Continued)
- Evaporation PVD:
- Thermal
- Electron beam
- Sputtering:
- Reactive sputter
- Cathodic arc
Material treatment for PVD

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Referensi 1. ASM Handbook Vol 5: Surface Engineering, ASM International, Ohio, USA, 1994.
2. A.A. Tracton: Coatings Technology Handbook, Taylor & Francis Group, Boca Raton, 2006
3. R. F. Bunshah: Handbook of Deposition Technologies for Films and Coatings Science, Technology and Applications, Noyes Publications, Park Ridge, NJ 1994
4. D. M. Mattox: Handbook of Physical Vapor Deposition (PVD) Processing Film Formation, Adhesion, Surface Preparation and Contamination Control, Noyes Publications, Westwood, NJ 1998

Aktivitas Lecture

Minggu 12

Materi Fundamental of Chemical Vapor Deposition
- Theoretical analysis
- Rate limiting
- Microstructure
- Equipment
- Reactions

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Referensi 1. A.A. Tracton: Coatings Technology Handbook, Taylor & Francis Group, Boca Raton, 2006
2. R. F. Bunshah: Handbook of Deposition Technologies for Films and Coatings Science, Technology and Applications, Noyes Publications, Park Ridge, NJ 1994
3. H. O. Pierson: Handbook of Chemical Vapor Deposition (CVD) Principles, Technology, and Applications, 2nd Ed., Noyes Publications, Park Ridge, NJ 1999

Aktivitas Lecture

Minggu 13

Materi Journal Reading:
Chemical reaction engineering in the design of CVD reactors

Media Internet
Computer

Referensi H. Komiyama!, Y. Shimogaki, Y. Egashira: Chem. Eng. Sci. 54 (1999) 1941-1957

Aktivitas Reading the Prescribed Journal
Quiz

Minggu 14

Materi Journal reading:
Understanding the chemical vapor deposition of diamond: recent progress

Media Internet
Computer

Referensi J. E. Butler, Y. A. Mankelevich, A. Cheesman, JieMa, and M.N. R. Ashfold: J. Phys. Condens. Matter 21 (2009) 364201

Aktivitas Reading, self-learning
Case study

Minggu 15

Materi Final examination

Media

Referensi

Aktivitas
