



Satuan Acara Pengajaran

MMS8120802 - Metalurgi Las

Pengajar

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Prof. Dr. Ir. Winarto M.Sc

Tujuan Perkuliahan

Mahasiswa mampu menjelaskan kemampu-lasan (weldability) pada beberapa jenis material (ferrous dan non ferrous) untuk aplikasi rekayasa serta mampu menjelaskan dan menganalisis pengaruh unsur paduan, pengaruh siklus termal dan kecepatan pendinginan serta beberapa parameter lasan terhadap karakteristik hasil lasan untuk mengontrol kualitas hasil lasan dalam konstruksi rekayasa.

Minggu 1

Materi INTRODUKSI:
- Penjelasan SAP & Tujuan MK
- Definisi Pengelasan
- Klasifikasi Penyambungan Material
- Aplikasi Pengelasan di Bidang Teknik

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Referensi 1. M. Anis & Winarto, Pengelasan, Diktat Kuliah (Lecture Notes)
2. Kou, S., Welding Metallurgy, Wiley & Sons, ISBN 0-471-43491-4
3. Granjon, H., Fundamentals of Welding Metallurgy, Abington Publishing, ISBN 1-85573-019-7
4. Easterling, K., Introduction to the Physical Metallurgy of Welding, Butterworth-Heneimann Ltd. ISBN 0-7506-0394-1
5. AWS Welding Handbook, Metals and Their Weldability, AWS, ISBN 0-87171-218-0
6. Norrish, J., Advanced Welding Processes, IOP Publishing Ltd., ISBN 0-85274-326-2
7. AWS - Welding Jurnal - published by The American Welding Society (AWS)

Aktivitas Kuliah & Diskusi

Minggu 2

Materi PENGELASAN BUSUR LISTRIK
- Uraian SMAW, FCAW, SAW, ESW
- Uraian GMAW (TIG & MIG)
- Uraian Plasma Arc Welding (PAW)
- Kawat Las : Coated & Wire electrodes

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Referensi 1. M. Anis & Winarto, Pengelasan, Diktat Kuliah (Lecture Notes)
2. Kou, S., Welding Metallurgy, Wiley & Sons, ISBN 0-471-43491-4
3. Granjon, H., Fundamentals of Welding Metallurgy, Abington Publishing, ISBN 1-85573-019-7
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6. Norrish, J., Advanced Welding Processes, IOP Publishing Ltd., ISBN 0-85274-326-2
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Tugas Home Work

Minggu 3

Materi PENGELASAN BUSUR LISTRIK
- Karakteristik Busur Listrik
- Peralatan / Mesin Las Busur Listrik
- Masukan Panas
- Parameter Las

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- Referensi**
1. M. Anis & Winarto, Pengelasan, Diktat Kuliah (Lecture Notes)
 2. Kou, S., Welding Metallurgy, Wiley & Sons, ISBN 0-471-43491-4
 3. Granjon, H., Fundamentals of Welding Metallurgy, Abington Publishing, ISBN 1-85573-019-7
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 6. Norrish, J., Advanced Welding Processes, IOP Publishing Ltd., ISBN 0-85274-326-2
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Minggu 4

Materi The Principles of Welding Metallurgy
 - Physical Welding Metallurgy
 - Effect of Heating & Cooling Rate
 - Geometrical of Weldments
 - Factors Influencing of Weld Properties

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- Referensi**
1. M. Anis & Winarto, Pengelasan, Diktat Kuliah (Lecture Notes)
 2. Kou, S., Welding Metallurgy, Wiley & Sons, ISBN 0-471-43491-4
 3. Granjon, H., Fundamentals of Welding Metallurgy, Abington Publishing, ISBN 1-85573-019-7
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 Tugas Home Work

Minggu 5

Materi Weldability of Carbon Steel (Metalurgi Las Baja Karbon)
- What is Weldability
- Factors influencing Weldability
- Carbon Steel Classification & Their Weldability
- How to Measure the Weldability of CS
- What kind of defects on Welding of CS

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Referensi

1. M. Anis & Winarto, Pengelasan, Diktat Kuliah (Lecture Notes)
2. Kou, S., Welding Metallurgy, Wiley & Sons, ISBN 0-471-43491-4
3. Granjon, H., Fundamentals of Welding Metallurgy, Abington Publishing, ISBN 1-85573-019-7
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6. Norrish, J., Advanced Welding Processes, IOP Publishing Ltd., ISBN 0-85274-326-2
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Minggu 6

Materi Weldability of Low Alloy Steel (Metalurgi Las Baja Paduan rendah)
- Low Alloy Steel Classification & Their Weldability
- How to Measure the Weldability of Low Alloy Steel
- What kind of defects occurring on Welding of Low Alloy Steels
- How to Weld the Low Alloy Steel

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Referensi

1. M. Anis & Winarto, Pengelasan, Diktat Kuliah (Lecture Notes)
2. Kou, S., Welding Metallurgy, Wiley & Sons, ISBN 0-471-43491-4
3. Granjon, H., Fundamentals of Welding Metallurgy, Abington Publishing, ISBN 1-85573-019-7
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Minggu 7

Materi Weldability of High Alloy Steel (Metalurgi Las Baja Paduan Tinggi)
- High Alloy Steel Clasification & Their Weldability
- How to Measure the Weldability of High Alloy Steel
- What kind of defects occuring on Welding of High Alloy Steels
- How to Weld the High Alloy Steel

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Referensi 1. M. Anis & Winarto, Pengelasan, Diktat Kuliah (Lecture Notes)
2. Kou, S., Welding Metallurgy, Wiley & Sons, ISBN 0-471-43491-4
3. Granjon, H., Fundamentals of Welding Metallurgy, Abington Publishing, ISBN 1-85573-019-7
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Minggu 8

Materi Mid Test

Media Paper

Referensi 1. M. Anis & Winarto, Pengelasan, Diktat Kuliah (Lecture Notes)
2. Kou, S., Welding Metallurgy, Wiley & Sons, ISBN 0-471-43491-4
3. Granjon, H., Fundamentals of Welding Metallurgy, Abington Publishing, ISBN 1-85573-019-7
4. Easterling, K., Introduction to the Physical Metallurgy of Welding, Butterworth-Heneimann Ltd. ISBN 0-7506-0394-1
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Minggu 9

Materi Weldability of Cast Irons (Metalurgi Las Besi Tuang)
- cast iron Clasification & Their Weldability
- How to Measure the Weldability of Cast Irons
- What kind of defects occuring on Welding of Cast Irons
- How to Weld the Cast Irons & Their Alloys

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Referensi

1. M. Anis & Winarto, Pengelasan, Diktat Kuliah (Lecture Notes)
2. Kou, S., Welding Metallurgy, Wiley & Sons, ISBN 0-471-43491-4
3. Granjon, H., Fundamentals of Welding Metallurgy, Abington Publishing, ISBN 1-85573-019-7
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Minggu 10

Materi Weldability of Aluminium Aloys (Metalurgi Las Aluminum & Paduannya)
- Aluminum Alloys Clasification & Their Weldability
- How to Measure the Weldability of Aluminum Alloys
- What kind of defects occuring on Welding of Aluminum Alloys
- How to Weld the Aluminum Alloys

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- Referensi**
1. M. Anis & Winarto, Pengelasan, Diktat Kuliah (Lecture Notes)
 2. Kou, S., Welding Metallurgy, Wiley & Sons, ISBN 0-471-43491-4
 3. Granjon, H., Fundamentals of Welding Metallurgy, Abington Publishing, ISBN 1-85573-019-7
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Minggu 11

Materi Weldability of Copper, Nickel & Magnesium (Metalurgi Las Cu, Ni, Mg)
 - Cu, Ni, Mg Clasification & Their Weldability
 - How to Measure the Weldability of Cu, Ni & Mg
 - What kind of defects occuring on Welding of Cu, Ni & Mg

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- Referensi**
1. M. Anis & Winarto, Pengelasan, Diktat Kuliah (Lecture Notes)
 2. Kou, S., Welding Metallurgy, Wiley & Sons, ISBN 0-471-43491-4
 3. Granjon, H., Fundamentals of Welding Metallurgy, Abington Publishing, ISBN 1-85573-019-7
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Minggu 12

Materi Weldability of Titanium Alloys (Metalurgi Las Titanium & Paduannya)
- Ti Alloys Clasification & Their Weldability
- How to Measure the Weldability of Ti Alloys
- What kind of defects occuring on Welding of Ti Alloys
- How to Weld the Ti Alloys

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Referensi

1. M. Anis & Winarto, Pengelasan, Diktat Kuliah (Lecture Notes)
2. Kou, S., Welding Metallurgy, Wiley & Sons, ISBN 0-471-43491-4
3. Granjon, H., Fundamentals of Welding Metallurgy, Abington Publishing, ISBN 1-85573-019-7
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Minggu 13

Materi Group 1- Presentation

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Referensi

1. M. Anis & Winarto, Pengelasan, Diktat Kuliah (Lecture Notes)
2. Kou, S., Welding Metallurgy, Wiley & Sons, ISBN 0-471-43491-4
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Aktivitas Presentasi Tugas Kelompok & Diskusi

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Materi Group 2 - Presentation

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Referensi

1. M. Anis & Winarto, Pengelasan, Diktat Kuliah (Lecture Notes)
2. Kou, S., Welding Metallurgy, Wiley & Sons, ISBN 0-471-43491-4
3. Granjon, H., Fundamentals of Welding Metallurgy, Abington Publishing, ISBN 1-85573-019-7
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6. Norrish, J., Advanced Welding Processes, IOP Publishing Ltd., ISBN 0-85274-326-2
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Aktivitas Presentasi Kelompok & Diskusi

Minggu 15

Materi Final Examination (UAS)

Media Paper

Referensi

Aktivitas UAS
