



# Satuan Acara Pengajaran

ENMT803114 - Metalurgi Las

Pengajar

*Prof. Dr. Ir. Winarto M.Sc*

## Minggu 1

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**Materi**           INTRODUKSI:  
- Penjelasan SAP MK Perpatahan & FA  
- Aspek enjiniring Kegagalan & Analisanya  
- Sumber/Faktor Kegagalan Material.

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**Media**            LCD

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**Referensi**       1. Wulpi, D.J., "Understanding How Components Fail?", ASM, 1988.  
2. Brooks C R., Metallurgical Failure Analysis

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**Aktivitas**

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## Minggu 2

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**Materi**            TEKNIK ANALISA KEGAGALAN-1  
- Tujuan Analisa Kegagalan  
- Tahapan dalam Analisa kegagalan  
- Uraian Skematis  
- Pengumpulan Data  
- Pengamatan Awal Patahan  
- NDT

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**Media**            LCD

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**Referensi**       1. Wulpi, D.J., "Understanding How Components Fail?", ASM, 1988.  
2. Brooks C R., Metallurgical Failure Analysis

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**Aktivitas** Tatap Muka  
Home-Work

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### Minggu 3

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**Materi** JENIS PERPATAHAN  
- Distorsi  
- Patah Ulet (Ductile)  
- Patah Getas (Brittle)  
- Patah Fatik (Fatigue)

STUDI KASUS LANJUTAN (Bahas 2 Contoh Kasus)

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**Media** LCD

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**Referensi** 1. Wulpi, D.J., "Understanding How Components Fail?", ASM, 1988.  
2. Brooks C R., Metallurgical Failure Analysis

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**Aktivitas** Kuliah Tatap Muka  
Tugas kelompok

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### Minggu 4

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**Materi** JENIS PERPATAHAN  
- Distorsi  
- Patah Ulet (Ductile)  
- Patah Getas (Brittle)  
- Patah Fatik (Fatigue)

STUDI KASUS LANJUTAN (Bahas 2 Contoh Kasus)

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**Media** LCD

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**Referensi** Referensi

1. Wulpi, D.J., "Understanding How Components Fail?", ASM, 1988.  
2. Brooks C R., Metallurgical Failure Analysis

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**Aktivitas** Kuliah Tatap Muka  
Tugas kelompok

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### Minggu 5

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<b>Materi</b>	Sistim Tegangan dan Residual Stress
<b>Media</b>	LCD
<b>Referensi</b>	1. Wulpi, D.J., "Understanding How Components Fail?", ASM, 1988. 2. Brooks C R., Metallurgical Failure Analysis
<b>Aktivitas</b>	Kuliah Tatap Muka Tugas Kelompok

## Minggu 6

<b>Materi</b>	Teori Mekanika Perpatahan & Aplikasinya
<b>Media</b>	LCD
<b>Referensi</b>	1. Wulpi, D.J., "Understanding How Components Fail?", ASM, 1988. 2. Brooks C R., Metallurgical Failure Analysis 3. Boyer, H.E.(Ed.), "Failures Analysis & Prevention?", Metal Handbook, 8th Ed. Vol. 11, ASM, 1992 4. Fellows, J.A.(Ed.), "Fractography & Atlas Fractography?" Metal Handbook, 9th Ed. Vol. 12, ASM, 1992
<b>Aktivitas</b>	Kuliah Tatap Muka Tugas Kelompok

## Minggu 7

<b>Materi</b>	Tolls for Failure Analysis
<b>Media</b>	LCD

- Referensi**
1. Wulpi, D.J., "Understanding How Components Fail?", ASM, 1988.
  2. Brooks C R., Metallurgical Failure Analysis
  3. Boyer, H.E.(Ed.), "Failures Analysis & Prevention" Metal Handbook, 8th Ed. Vol. 11, ASM, 1992
  4. Fellows, J.A.(Ed.), "Fractography & Atlas Fractography", Metal Handbook, 9th Ed. Vol. 12, ASM, 1992
  5. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol. 1
  6. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol . 2
  7. Stuart A. Shiels , "Corrosion, Failure Analysis and Metallography"
  8. Stephens, R.I (Ed), "Case Studies for Fatigue Education" ASTM PCN, STP 1250, 1994
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**Aktivitas**      Kuliah Tatap Muka  
Tugas Kelompok

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## Minggu 8

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**Materi**            Perpatahan Akibat Keausan (wear)  
STUDI KASUS DI KELAS (Bahas 2 Contoh Kasus)

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**Media**            LCD

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- Referensi**
1. Wulpi, D.J., "Understanding How Components Fail?", ASM, 1988.
  2. Brooks C R., Metallurgical Failure Analysis
  3. Boyer, H.E.(Ed.), "Failures Analysis & Prevention" Metal Handbook, 8th Ed. Vol. 11, ASM, 1992
  4. Fellows, J.A.(Ed.), "Fractography & Atlas Fractography", Metal Handbook, 9th Ed. Vol. 12, ASM, 1992
  5. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol. 1
  6. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol . 2
  7. Stuart A. Shiels , "Corrosion, Failure Analysis and Metallography"
  8. Stephens, R.I (Ed), "Case Studies for Fatigue Education" ASTM PCN, STP 1250, 1994
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**Aktivitas**      Kuliah & Diskusi  
Tuags Kelompok

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## Minggu 9

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**Materi** Perpatahan Akibat Kerapuhan (embrittleness)  
STUDI KASUS LANJUTAN (Bahas 2 Contoh Kasus)

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**Media** LCD

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**Referensi**

1. Wulpi, D.J., "Understanding How Components Fail?", ASM, 1988.
2. Brooks C R., Metallurgical Failure Analysis
3. Boyer, H.E.(Ed.), "Failures Analysis & Prevention? Metal Handbook, 8th Ed. Vol. 11, ASM, 1992
4. Fellows, J.A.(Ed.), "Fractography & Atlas Fractography", Metal Handbook, 9th Ed. Vol. 12, ASM, 1992
5. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol. 1
6. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol . 2
7. Stuart A. Shiels , "Corrosion, Failure Analysis and Metallography"
8. Stephens, R.I (Ed), "Case Studies for Fatigue Education" ASTM PCN, STP 1250, 1994

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**Aktivitas** Kuliah & Diskusi  
Tugas Kelompok

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## Minggu 10

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**Materi** Perpatahan Akibat Proses Heat Treatment  
STUDI KASUS LANJUTAN (Bahas 2 Contoh Kasus)

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**Media** LCD

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- Referensi**
1. Wulpi, D.J., "Understanding How Components Fail?", ASM, 1988.
  2. Brooks C R., Metallurgical Failure Analysis
  3. Boyer, H.E.(Ed.), "Failures Analysis & Prevention? Metal Handbook, 8th Ed. Vol. 11, ASM, 1992
  4. Fellows, J.A.(Ed.), "Fractography & Atlas Fractography", Metal Handbook, 9th Ed. Vol. 12, ASM, 1992
  5. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol. 1
  6. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol . 2
  7. Stuart A. Shiels , "Corrosion, Failure Analysis and Metallography"
  8. Stephens, R.I (Ed), "Case Studies for Fatigue Education" ASTM PCN, STP 1250, 1994
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**Aktivitas**      Kuliah & Diskusi  
Tugas Kelompok

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## Minggu 11

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**Materi**            Perpatahan Akibat Proses Creep  
STUDI KASUS LANJUTAN (Bahas 2 Contoh Kasus)

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**Media**            LCD

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- Referensi**
1. Wulpi, D.J., "Understanding How Components Fail?", ASM, 1988.
  2. Brooks C R., Metallurgical Failure Analysis
  3. Boyer, H.E.(Ed.), "Failures Analysis & Prevention? Metal Handbook, 8th Ed. Vol. 11, ASM, 1992
  4. Fellows, J.A.(Ed.), "Fractography & Atlas Fractography", Metal Handbook, 9th Ed. Vol. 12, ASM, 1992
  5. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol. 1
  6. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol . 2
  7. Stuart A. Shiels , "Corrosion, Failure Analysis and Metallography"
  8. Stephens, R.I (Ed), "Case Studies for Fatigue Education" ASTM PCN, STP 1250, 1994
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**Aktivitas**      Kuliah & Diskusi  
Tugas Kelompok

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## Minggu 12

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**Materi** Perpatahan Akibat Tegangan Sisa (Residual Stress)  
Studi Kasus & Analisa Permasalahan FA

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**Media** LCD

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**Referensi**

1. Wulpi, D.J., "Understanding How Components Fail?", ASM, 1988.
2. Brooks C R., Metallurgical Failure Analysis
3. Boyer, H.E.(Ed.), "Failures Analysis & Prevention? Metal Handbook, 8th Ed. Vol. 11, ASM, 1992
4. Fellows, J.A.(Ed.), "Fractography & Atlas Fractography", Metal Handbook, 9th Ed. Vol. 12, ASM, 1992
5. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol. 1
6. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol . 2
7. Stuart A. Shiels , "Corrosion, Failure Analysis and Metallography"
8. Stephens, R.I (Ed), "Case Studies for Fatigue Education" ASTM PCN, STP 1250, 1994

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**Aktivitas** Kuliah & Diskusi  
Tugas Kelompok

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## Minggu 13

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**Materi** Studi Kasus & Pembahasan Permasalahan FA

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**Media** LCD

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- Referensi**
1. Wulpi, D.J., "Understanding How Components Fail?", ASM, 1988.
  2. Brooks C R., Metallurgical Failure Analysis
  3. Boyer, H.E.(Ed.), "Failures Analysis & Prevention? Metal Handbook, 8th Ed. Vol. 11, ASM, 1992
  4. Fellows, J.A.(Ed.), "Fractography & Atlas Fractography", Metal Handbook, 9th Ed. Vol. 12, ASM, 1992
  5. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol. 1
  6. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol . 2
  7. Stuart A. Shiels , "Corrosion, Failure Analysis and Metallography"
  8. Stephens, R.I (Ed), "Case Studies for Fatigue Education" ASTM PCN, STP 1250, 1994
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**Aktivitas**      Kuliah & Diskusi  
                         Tugas Kelompok

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## Minggu 14

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**Materi**            PRESENTASI TIAP GROUP

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**Media**            LCD

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- Referensi**
1. Wulpi, D.J., "Understanding How Components Fail?", ASM, 1988.
  2. Brooks C R., Metallurgical Failure Analysis
  3. Boyer, H.E.(Ed.), "Failures Analysis & Prevention? Metal Handbook, 8th Ed. Vol. 11, ASM, 1992
  4. Fellows, J.A.(Ed.), "Fractography & Atlas Fractography", Metal Handbook, 9th Ed. Vol. 12, ASM, 1992
  5. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol. 1
  6. Khlefa A. Esaklul , "Hand Book Of Case Histories In Failure Analysis" Vol . 2
  7. Stuart A. Shiels , "Corrosion, Failure Analysis and Metallography"
  8. Stephens, R.I (Ed), "Case Studies for Fatigue Education" ASTM PCN, STP 1250, 1994
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**Aktivitas**      Kuliah & Diskusi  
                         Tugas Kelompok

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## Minggu 15

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**Materi** Final Examination (UAS)

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**Media** Paper

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**Referensi**

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**Aktivitas** UAS

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