

LAMPIRAN

Perhitungan Laju korosi:

Tanpa Perlakuan panas (A1):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,049}{25,6 \text{ cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,059 \text{ mm/y} \end{aligned}$$

Temperature 850°C (X1):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,03}{25,6 \text{ cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,036 \text{ mm/y} \end{aligned}$$

Temperature 850°C (Y1):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,01}{25,6 \text{ cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,012 \text{ mm/y} \end{aligned}$$

Temperature 850°C (Z1):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,032}{25,6 \text{ cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,038 \text{ mm/y} \end{aligned}$$

Temperature 900°C (X4):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,024}{25,6\text{cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,029 \text{ mm/y} \end{aligned}$$

Temperature 900°C (Y4):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,035}{25,6\text{cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,042 \text{ mm/y} \end{aligned}$$

Temperature 900°C (Z4):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,054}{25,6\text{cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,065 \text{ mm/y} \end{aligned}$$

Temperature 950°C (X7):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,074}{25,6\text{cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,089 \text{ mm/y} \end{aligned}$$

Temperature 950°C (Y7):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,028}{25,6\text{cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,033 \text{ mm/y} \end{aligned}$$

Temperature 950°C (Z7):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,045}{25,6\text{cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,054 \text{ mm/y} \end{aligned}$$

Tanpa perlakuan panas (A2)

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,101}{25,6\text{cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,122\text{mm/y} \end{aligned}$$

Temperature 850°C (X2):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,064}{25,6\text{cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,077 \text{ mm/y} \end{aligned}$$

Temperature 850°C (Y2):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,064}{25,6\text{cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,077 \text{ mm/y} \end{aligned}$$

Temperature 850°C (Z2):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,097}{25,6\text{cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,117 \text{ mm/y} \end{aligned}$$

Temperature 900°C (X5):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,07}{25,6 \text{ cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,084 \text{ mm/y} \end{aligned}$$

Temperature 900°C (Y5):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,082}{25,6 \text{ cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,099 \text{ mm/y} \end{aligned}$$

Temperature 900°C (Z5):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,038}{25,6 \text{ cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,046 \text{ mm/y} \end{aligned}$$

Temperature 950°C (X8):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,065}{25,6 \text{ cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,078 \text{ mm/y} \end{aligned}$$

Temperature 950°C (Y8):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,062}{25,6 \text{ cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,075 \text{ mm/y} \end{aligned}$$

Temperature 950°C (Z8):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,11}{25,6\text{cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,133 \text{ mm/y} \end{aligned}$$

Tanpa perlakuan panas (A3)

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,073}{25,6\text{cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,088 \text{ mm/y} \end{aligned}$$

Temperature 850°C (X3):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,043}{25,6\text{cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,052 \text{ mm/y} \end{aligned}$$

Temperature 850°C (Y3):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,062}{25,6\text{cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,075 \text{ mm/y} \end{aligned}$$

Temperature 850°C (Z3):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,058}{25,6\text{cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,070 \text{ mm/y} \end{aligned}$$

Temperature 900°C (X6):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,058}{25,6 \text{ cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,069 \text{ mm/y} \end{aligned}$$

Temperarure 900°C (Y6):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,061}{25,6 \text{ cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,073 \text{ mm/y} \end{aligned}$$

Temperature 900°C (Z6):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,06}{25,6 \text{ cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,072 \text{ mm/y} \end{aligned}$$

Temperature 950°C (X9):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,049}{25,6 \text{ cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,059 \text{ mm/y} \end{aligned}$$

Temperature 950°C (Y9):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,059}{25,6 \text{ cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,100 \text{ mm/y} \end{aligned}$$

Temperature 950°C (Z9):

$$\begin{aligned} CR \text{ (mm/y)} &= \frac{k.w}{A.t.\rho} \\ &= \frac{8,76 \times 10^4 \times 0,061}{25,6 \text{ cm}^2 \times 360 \text{ jam} \times 7,85 \text{ g/cm}^3} \\ &= 0,073 \text{ mm/y} \end{aligned}$$

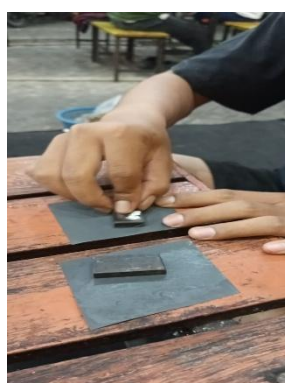
Persiapan proses *heat treatment pack carburizing*



Uji kekerasan rockwell HRC



Proses menghaluskan permukaan spesimen persiapan uji struktur mikro



Pengujian struktur mikro



Pengambilan sampel untuk media korosif



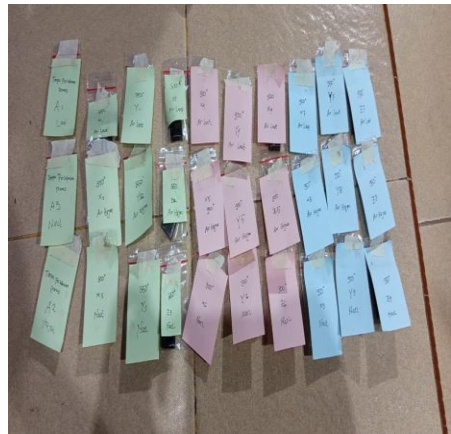
Validasi nilai pH media korosi



Proses penimbangan awal dan akhir



Klasifikasi sesuai kode spesimen



Sertifikat baja ASTM A-36

PT. GUNUNG RAJA PAKSI
steel is our business
Plate Mill

MILL TEST CERTIFICATE

As per EN 10204 "2.0.04" - 3.1

Product: Hot Rolled Steel Plates
ASTM A 36
General Requirement: As Rolled
Supply Condition: Rolled

Head Office & Factory:
Jl. Perajungan No. 8, Kp. Tangut RT. 009/008 Sukadono,
Cibangsek, Bakti, TROM, West Java, INDONESIA

CERTIFICATE NUMBER: GRP-QA-MTC/11379/VIII/2019
CERTIFICATE DATE: 06/02/2021
S/O ANAPTA No.: SP9-1907-0053

PLATE ID	DIMENSIONS				WEIGHT kg/m ²	SPT (HRC)	CHEMICAL ANALYSIS (%)														TENSILE TEST		BENDING		IMPACT VALUE (Joule)		
	T	R	L	THICKNESS																	Yield		180°		Charpy		
	mm	mm	mm	mm			C	Mn	P	S	Si	Cu	Cr	Ni	Mo	V	Al	Ti	N	CE	Y _{0.2} N/mm ²	Y _T N/mm ²	180° mm	180° mm	10° mm	10° mm	
1902 R 190216 A2-2	1	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	0.001	282	416	31				
1902 R 190216 A2-3	1	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 A2-4	1	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 A2-5	1	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 A2-6	1	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 A2-7	1	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 A2-8	1	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 A2-9	1	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 A2-10	1	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 C2-1	12	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 C2-2	12	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 C2-3	12	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 C2-4	12	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 C2-5	12	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 C2-6	12	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 C2-7	12	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 C2-8	12	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 C2-9	12	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					
1902 R 190216 C2-10	12	1500	3000	1.022	1	0.14	0.225	0.008	0.009	0.010	0.004	0.00	0.02	0.05	0.002	0.001	0.001	0.001	0.001	282	416	31					

REMARKS:
We hereby certify that the material described herein has been made
& satisfactorily tested in accordance with above specification

Prepared by: [Signature]
Sud M

QC RAJAPAKSI
[Signature]
Rahm Yudi Haryo
QUALITY ASSURANCE

GRP/MQA.12

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