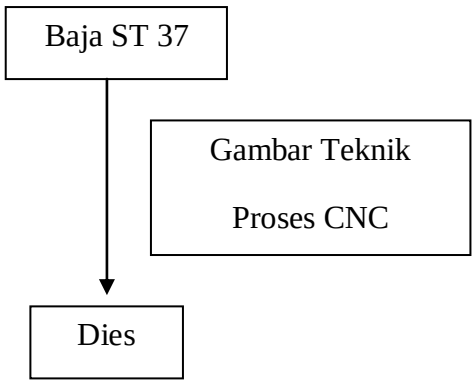
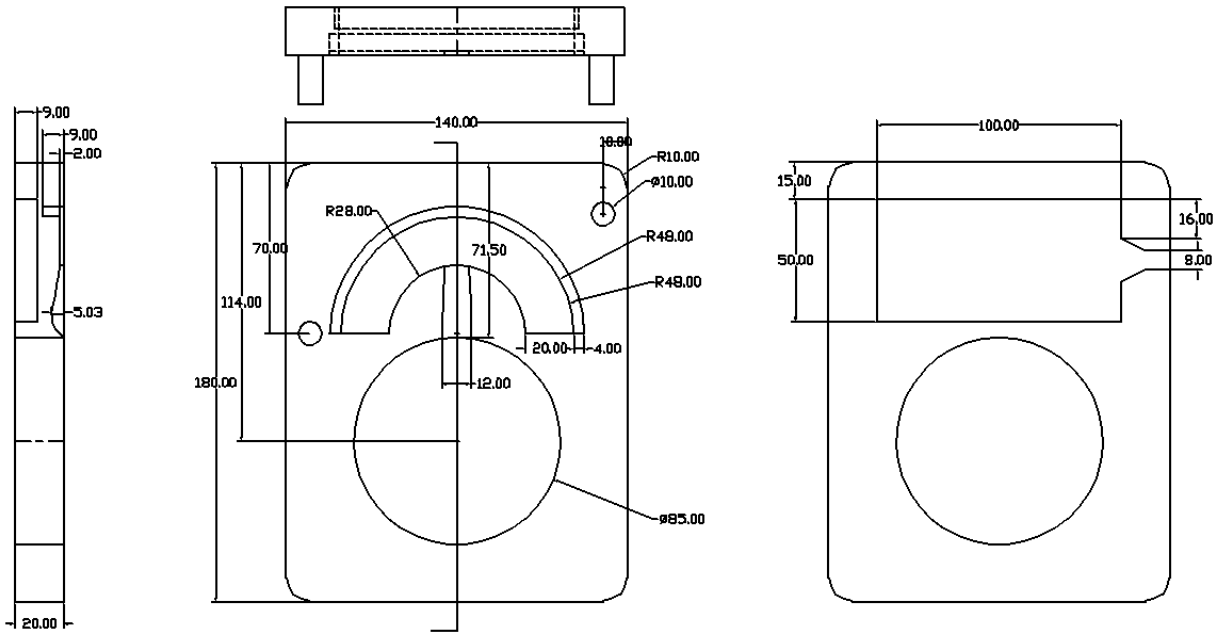
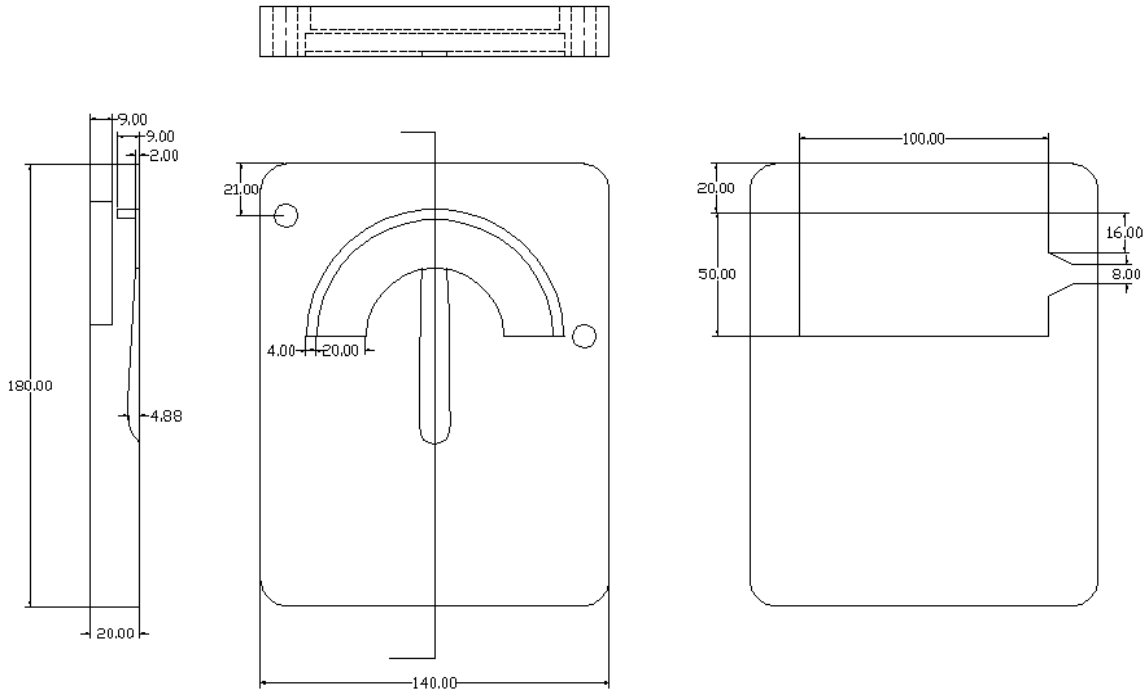
LAMPIRAN A

A.1 Skema Pembuatan *Dies*



A.2 Gambar Teknik *Dies*




9.00
9.00
2.00
180.00
4.88
20.00
21.00
4.00
20.00
140.00
100.00
20.00
16.00
50.00
8.00

LAMPIRAN B

B.1 PENGUJIAN KOMPOSISI ADC12

Mojokerto, 12-04-12.

SURAT JALAN / PENGANTAR

Nomor : 008/ PJL /.

No. Polisi Kendaraan : _____

Dari / Ke Gudang : _____

Dari / Ke Kapal : _____

Kepada
Yth. UNDIP.

Merek	Jumlah Barang (colli / units)*)	Berat Barang (Ton/M3/Kg)*)	Jenis Barang	Keterangan
		20. kg	Aluminium INGOT ADC 12 %	

Harap barang-barang tersebut di atas diterima dengan baik

Penerima, Pembawa, Pengirim,

(_____) (_____) (_____)

PERHATIAN : 1. Untuk memudahkan pemeriksaan agar diisi menurut keadaan yang sebenarnya

Program: AL-ADC-12 04/12/2012 09:09:12 AM
Comment: Al-ADC-12 115136/02
Single spark(s) Elements: Concentration

Sample No: Quality:
Sample Id:

No	Si %	Fe %	Cu %	Mn %	Mg %	Zn %	Ni %
1	10.634	0.82	1.77	0.091	0.266	0.78	0.041
2	10.640	0.84	1.83	0.093	0.270	0.78	0.043

No	Cr %	Pb %	Sn %	Ti %	Be %	Ca %	Na %
1	0.038	0.070	0.045	0.017	< 0.001	0.002	< 0.001
2	0.039	0.074	0.047	0.017	< 0.001	0.002	< 0.001

No	Sb %	Sr %	Al %
1	< 0.000	< 0.000	85.421
2	< 0.000	< 0.000	85.319

LAMPIRAN C

C.1 PERHITUNGAN DENSITAS

Data Hasil Penimbangan Massa Kering dan Basah

Temperatur Penuangan	700°C			750°C			800°C		
Posisi	1	2	3	1	2	3	1	2	3
Massa kering (g)	2.72	1.61	1.25	1.98	1.64	1.65	2.1	2.41	1.28
Massa basah (g)	0.99	0.58	0.45	0.72	0.6	0.6	0.77	0.89	0.46

Rumus perhitungan densitas ADC12 teoritis:

$$\rho_{th} = \rho_{Al}.V_{Al} + \rho_{Si}.V_{Si} + ...$$

Dimana:

ρ_{th} : densitas teoritis (gram/cm^3)

ρ_{Al} : densitas Al (gram/cm^3)

ρ_{Si} : densitas Si (gram/cm^3)

V_{Al} : fraksi Volume Al

V_{Si} : fraksi Volume Si

Tabel C.1. Komposisi dan Densitas Tiap-Tiap Unsur pada ADC12

No.	Unsur	Density (g/cm^3)	Prosen Berat (wt%)
1.	Si	2.33	10.637
2.	Fe	7.87	0.83
3.	Cu	8.96	1.8
4.	Mn	7.30	0.092
5.	Mg	1.74	0.268
6.	Zn	7.14	0.78
7.	Ni	8.90	0.042
8.	Cr	7.15	0.0385
9.	Pb	11.34	0.072
10.	Sn	7.26	0.046
11.	Ti	4.50	0.017
12.	Be	1.85	< 0.001
13.	Ca	1.54	0.002
14.	Na	0.97	< 0.001
15.	Sb	6.68	< 0.000

16.	Sr	2.64	< 0.000
17.	Al	2.70	85.37

$$\rho_{th} = \rho_{Si}.V_{Si} + \rho_{Fe}.V_{Fe} + \rho_{Cu}.V_{Cu} + \rho_{Mn}.V_{Mn} + \rho_{Mg}.V_{Mg} + \rho_{Zn}.V_{Zn} + \rho_{Ni}.V_{Ni} + \rho_{Cr}.V_{Cr}$$

$$\rho_{Pb}.V_{Pb} + \rho_{Sn}.V_{Sn} + \rho_{Ti}.V_{Ti} + \rho_{Ca}.V_{Ca} + \rho_{Al}.V_{Al}$$

$$= (2.33 \times 0.124093) + (7.87 \times 0.002865) + (8.93 \times 0.005476) + (7.30 \times 0.000343)$$

$$+ (1.74 \times 0.004186) + (7.13 \times 0.002971) + (8.91 \times 0.000128) + (7.15 \times 0.000146)$$

$$+ (11.34 \times 0.000173) + (7.29 \times 0.000172) + (4.50 \times 0.000103) + (1.54 \times 0.000353)$$

$$+ (2.70 \times 0.85931)$$

$$= 2.717593 gr/cm^3$$

$$= 2.718\ gr/cm^3$$

Rumus perhitungan densitas aktual:

$$\rho_m = \frac{m_s}{(m_s - m_g)}$$

Dimana:

ρ_m : densitas aktual (gram/cm^3)

m_s : massa sampel kering (gram)

m_g : massa sampel yang digantung di dalam air (gram)

$\rho\ H_2O$: massa jenis air = 1 gram/cm^3

1. Temperatur Penuangan 700^{o}C

   a. Posisi 1 (Bawah)

$$\rho_m = \frac{2.72}{(2.72 - 0.99)} = 1.572 gr/cm^3$$

   b. Posisi 2 (Tengah)

$$\rho_m = \frac{1.61}{(1.61 - 0.58)} = 1.563 gr/cm^3$$

   c. Posisi 3 (Atas)

$$\rho_m = \frac{1.25}{(1.25 - 0.45)} = 1.563 gr/cm^3$$

d. Rata-Rata

$$\rho = \frac{1.572 + 1.563 + 1.563}{3} = 1.543 gr/cm^3$$

2. Temperatur Penuangan 750^{o}C

a. Posisi 1 (Bawah)

$$\rho_m = \frac{1.98}{(1.98 - 0.72)} = 1.571 gr/cm^3$$

b. Posisi 2 (Tengah)

$$\rho_m = \frac{1.64}{(1.64 - 0.6)} = 1.577 gr/cm^3$$

c. Posisi 3 (Atas)

$$\rho_m = \frac{1.65}{(1.65 - 0.6)} = 1.571 gr/cm^3$$

d. Rata-Rata

$$\rho = \frac{1.571 + 1.577 + 1.571}{3} = 1.573 gr/cm^3$$

3. Temperatur Penuangan 800^{o}C

a. Posisi 1 (Bawah)

$$\rho_m = \frac{2.1}{(2.1 - 0.77)} = 1.579 gr/cm^3$$

b. Posisi 2 (Tengah)

$$\rho_m = \frac{2.41}{(2.41 - 0.89)} = 1.586 gr/cm^3$$

c. Posisi 3 (Atas)

$$\rho_m = \frac{1.28}{(1.28 - 0.46)} = 1.561 gr/cm^3$$

d. Rata-Rata

$$\rho = \frac{1.579 + 1.586 + 1.561}{3} = 1.575 gr/cm^3$$

Rumus perhitungan Porositas

$$Porosity = 1 - \frac{\rho_m}{\rho_{th}} \quad \text{.....(3.3)}$$

dimana:

ρ_m : densitas aktual (gram/cm^3)

ρ_{th} : densitas teoritis (gram/cm^3) = 2.718 gram/cm^3

1. Temperatur Penuangan 700^{o}C
   a. Posisi 1 (Bawah)

$$1 - \frac{1.572}{2.718} = 0.421 = 42.1\%$$

   b. Posisi 2 (Tengah)

$$1 - \frac{1.563}{2.718} = 0.425 = 42.5\%$$

   c. Posisi 3 (Atas)

$$1 - \frac{1.563}{2.718} = 0.425 = 42.5\%$$

   d. Rata-Rata

$$\rho = \frac{0.421 + 0.425 + 0.425}{3} = 0.424 = 42.4\%$$

e. Temperatur Penuangan 750^{o}C
   a. Posisi 1 (Bawah)

$$1 - \frac{1.571}{2.718} = 0.422 = 42.2\%$$

   b. Posisi 2 (Tengah)

$$1 - \frac{1.577}{2.718} = 0.420 = 42\%$$

c. Posisi 3 (Atas)

$$1 - \frac{1.571}{2.718} = 0.422 = 42.2\%$$

d. Rata-Rata

$$\rho = \frac{0.422 + 0.420 + 0.422}{3} = 0.421 = 42.1\%$$

e. Temperatur Penuangan 800^{o}C

e. Posisi 1 (Bawah)

$$1 - \frac{1.579}{2.718} = 0.419 = 41.9\%$$

f. Posisi 2 (Tengah)

$$1 - \frac{1.586}{2.718} = 0.417 = 41.7\%$$

g. Posisi 3 (Atas)

$$1 - \frac{1.561}{2.718} = 0.426 = 42.6\%$$

h. Rata-Rata

$$\rho = \frac{0.419 + 0.417 + 0.426}{3} = 0.420 = 42\%$$