

PENGELASAN CO₂-MIG

Topik Materi:

- Garis besar pengelasan
- Tipe – tipe pengelasan
- Karakteristik pengelasan
- Pengelasan untuk panel bodi kendaraan
- Prinsip dasar pengelasan CO₂ – MIG
- Karakteristik pengelasan CO₂ – MIG
- Konstruksi perlengkapan pengelasan CO₂ – MIG
- Kondisi – kondisi pengelasan
- Metode – metode pengelasan
- Peralatan , perlengkapan & bahan
- Prosedur pengelasan CO₂ – MIG
- Tipe – tipe kerusakan pengelasan CO₂ - MIG

Garis Besar Pengelasan

- Metode Penyambungan Logam:

1. Mekanis :

Rivet, & Baut Mur

2. Metalurgis :

Las

Type – type Pengelasan

- ◉ Las Tekan (Pressure Welding) :
Spot Welding
- ◉ Las Lebur (Fusion Welding) :
CO₂-MIG Welding
- ◉ Las Kuningan (Braze Welding) :
Kuningan Keras

Karakteristik Pengelasan

- ◉ Dapat Membangun Suatu Bentuk yang kokoh.
- ◉ Berat dapat dikurangi
- ◉ Kedap terhadap Udara & Air
- ◉ Efisiensi Produksi meningkat
- ◉ Memerlukan keahlian
- ◉ Panel dapat Rusak bila terlalu panas

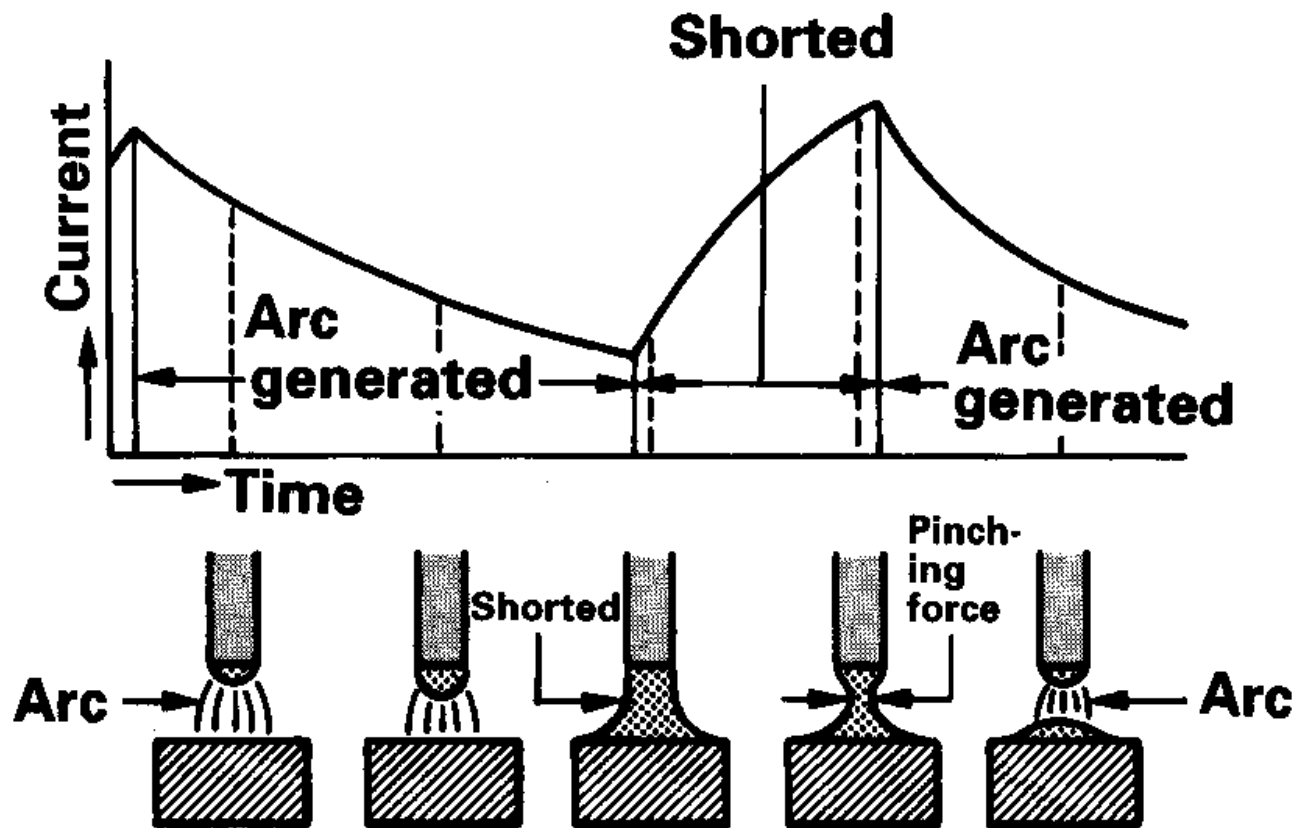
Pengelasan Body Kendaraan

- ⦿ Metode las : Las titik , Las Busur CO₂
- ⦿ Brazing pada Area Yang di instruksikan Pabrik
- ⦿ Las Oxy Acetylene, tdk dianjurkan

Prinsip Dasar Las CO₂- MIG

Pengelasan CO₂ adalah suatu type dari las busur yang termasuk kategori las lebur. Type ini menggunakan sebuah kawat pengisi (filler wire) sebagai elektroda yang menimbulkan nyala busur (pelepasan listrik) antara kawat pengisi dan logam dasar. Panas yang ditimbulkan oleh busur nyala ini melumerkan dan melebur kawat pengisi yang secara otomatis diumpankan pada kecepatan yang tetap.

Short Circuit Arc Welding



Karakteristik Las CO₂ - MIG

1. Kerusakan pada panel tipis berkurang
2. Memerlukan ketrampilan
3. Semua posisi pengelasan dapat dilakukan
4. Slag Pengelasan Sedikit
5. Tidak cocok kondisi berangin

MIG/MAG Welding

- ◉ **Metal inert gas (MIG) welding**
Gas yang digunakan: argon & helium
- ◉ **Metal active gas (MAG) welding**
**Gas yang digunakan: carbon dioxide
atau campuran argon/carbon dioxide**

Karakteristik setiap tipe pengelasan

	Tipe pengelasan/karakteristik	Kecepatan pengelasan	Penetrasi pengelasan	Percikan (Jumlah)	Biaya gas	Tipe base metal
Shielding gas arc welding	Pengelasan MIG (100%)	○	○	○	△	Aluminium Stainless stell
	Pengelasan MAG (Ar + CO ₂)(Ar + CO ₂)	○	○	○	△	Stainless stell Baja
	Pengelasan dgn CO ₂ (CO ₂)(100%CO ₂)	○	○	△	○	Baja



Baik

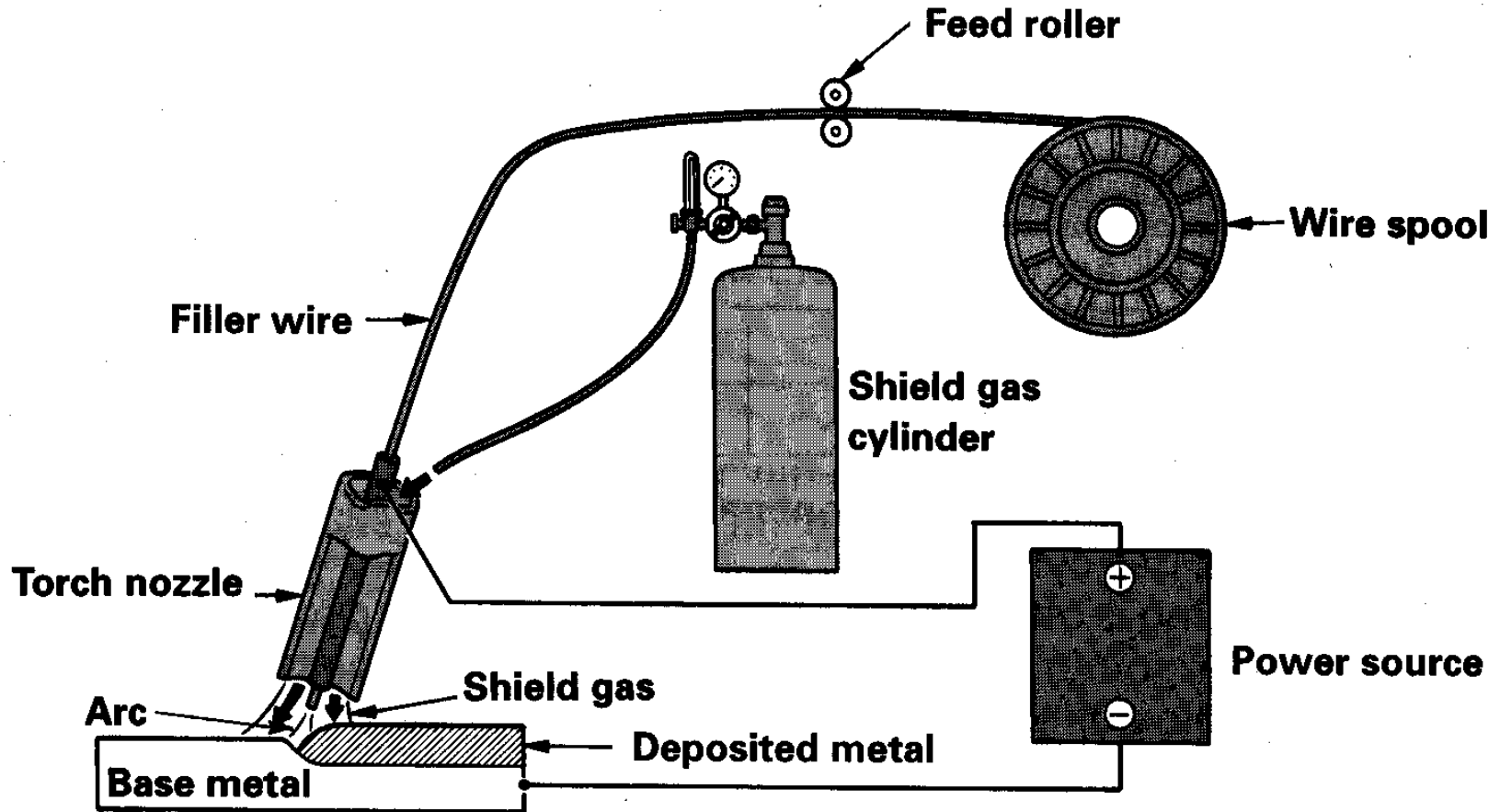


Tidak Baik

Konstruksi Perlengkapan Pengelasan

- 1. Torch**
- 2. Pengumpan kawat**
- 3. Peralatan supply gas perisai**
- 4. Alat pengontrol**
- 5. Sumber daya**

Perlengkapan Pengelasan



Welding gas

FUNGSI GAS :

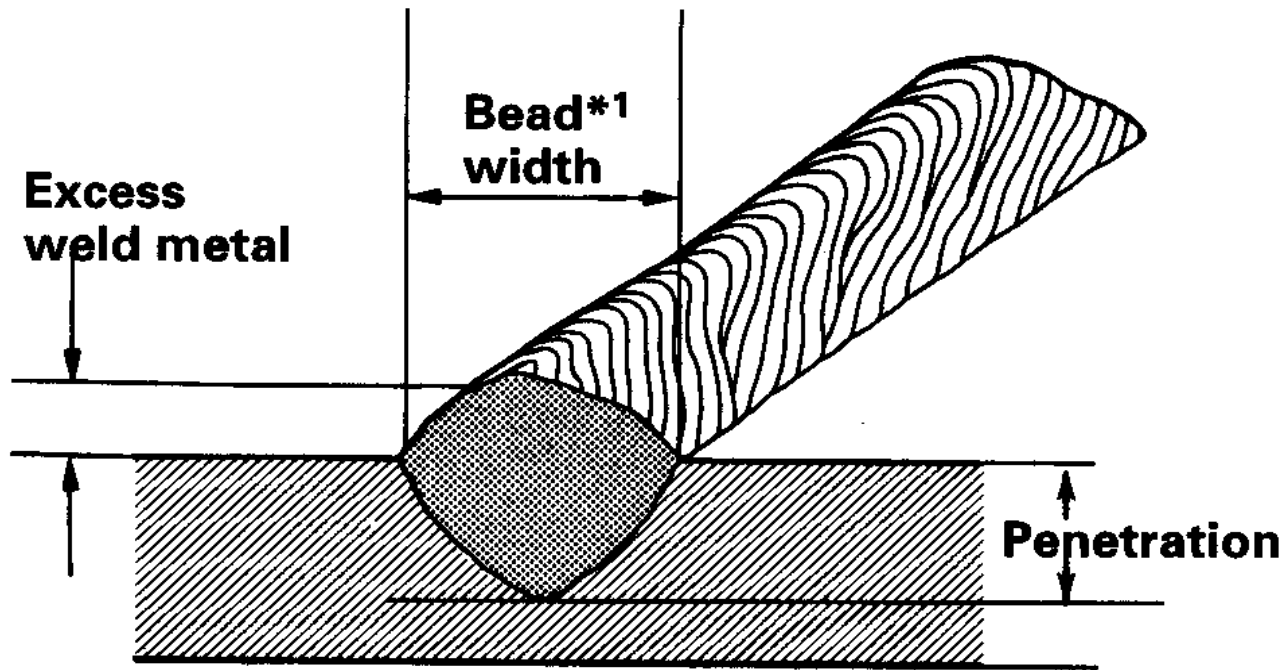
- ◉ **Melindungi dari kontaminasi dengan atmosphere (udara).**
- ◉ **Untuk mendukung kestabilan busur nyala (arc)**
- ◉ **Mengontrol bentuk dari beads pengelasan**
- ◉ **Mengontrol kekuatan logam pengelasan**

Kawat las

- ◉ **Diameter kawat : 0.6, 0.8, 1.0mm**
- ◉ **Berat kawat : 5 - 15kg**

Kondisi pengelasan

1. Arus pengelasan

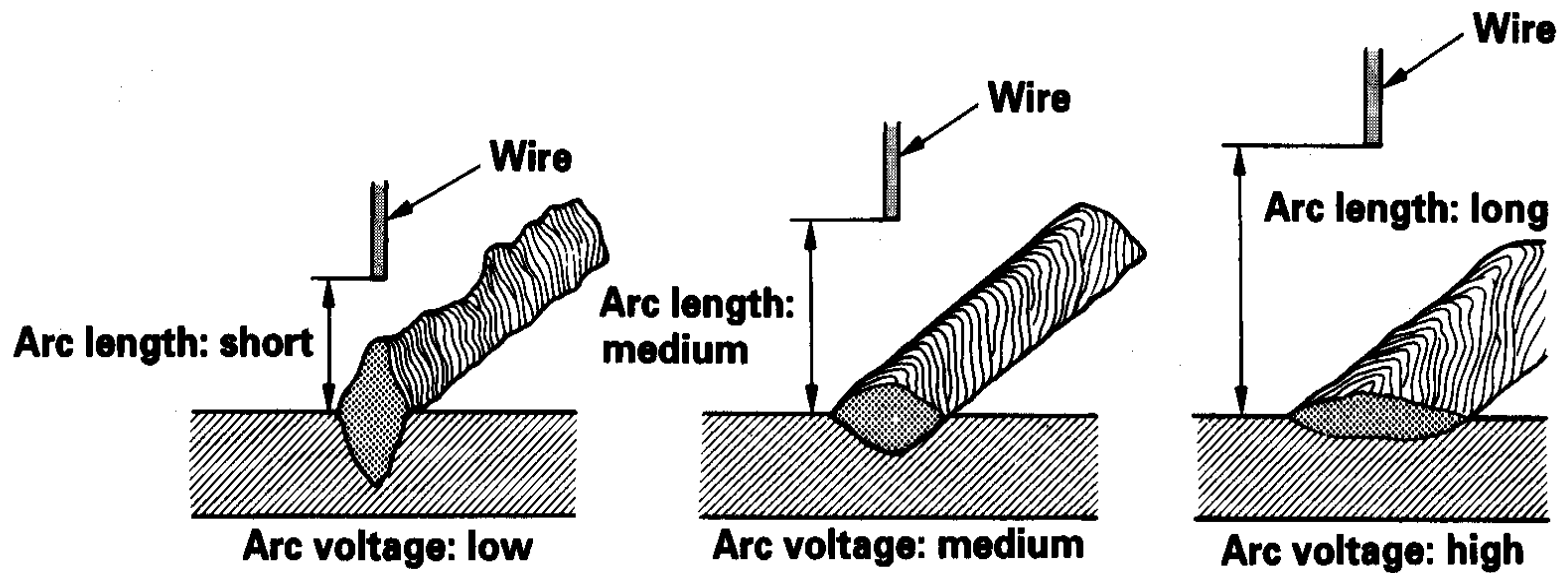


Penetration, excess weld metal, bead width

Hubungan antara Diameter kawat, ketebalan Panel dan arus pengelasan

Panel thickness mm (in.)	0.6 (0.024)	0.8 (0.031)	1.0 (0.039)	1.2 (0.047)	1.6 (0.063)	2.3 (0.091)	3.2 (0.126)
Wire diameter mm (in.)							
0.6 (0.024)	20 ~ 30 A	30 ~ 40 A	40 ~ 50 A	50 ~ 60 A			
0.8 (0.031)			40 ~ 50 A	50 ~ 60 A	60 ~ 90 A	100 ~ 120 A	
0.9 (0.035)					60 ~ 90 A	100 ~ 120 A	120 ~ 150 A

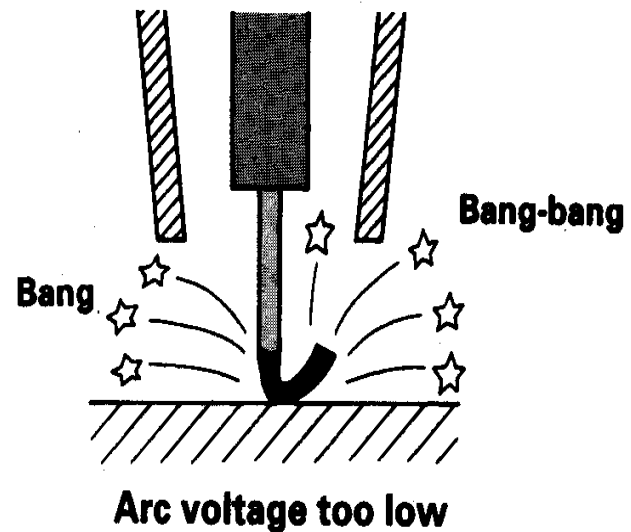
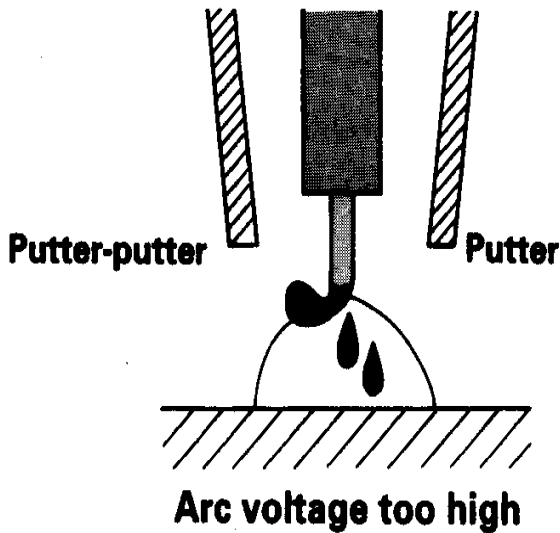
2. Arc Voltage (Tegangan Busur)



Reference:

When the arc voltage is proper, a smooth buzzing sound is heard.

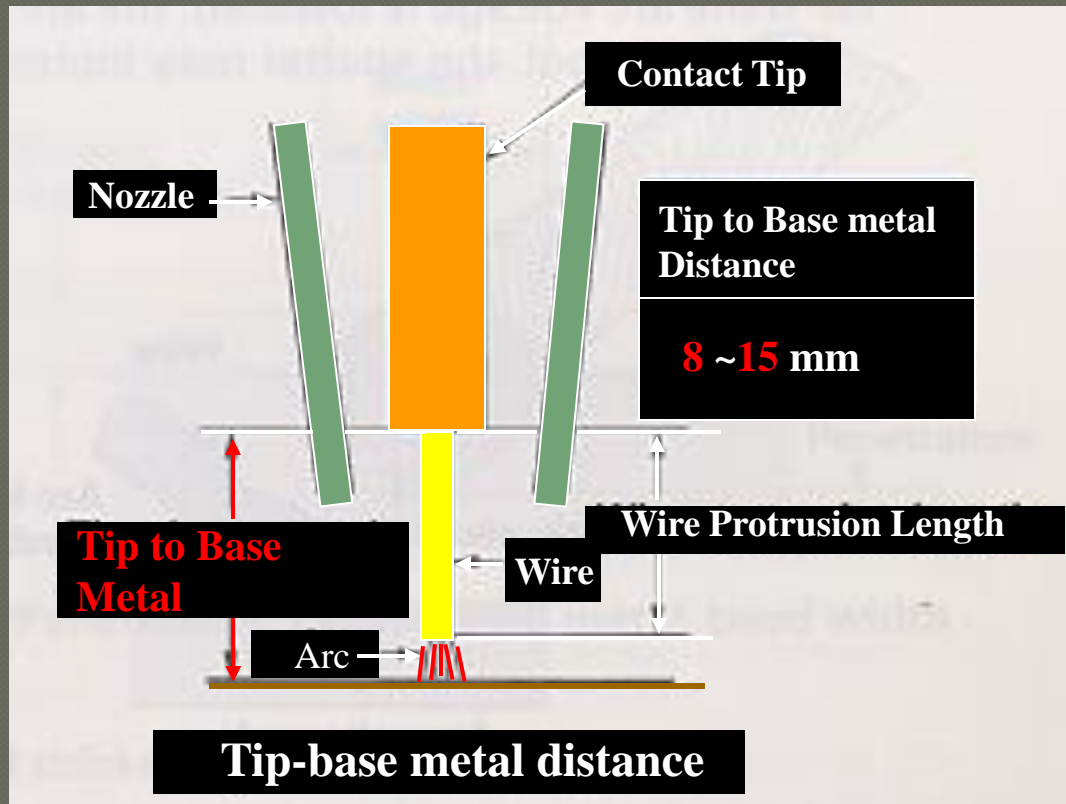
If the arc voltage is too high, the arc length tends to become longer, and the amount of spatter also increases along with the pattering noise. On the other hand, if the arc voltage is too low, the wire dips into the molten pool, and emits a banging sound without actually producing an arc.



3. Jumlah Aliran Gas

- ⦿ Jumlah aliran gas perisai 10 – 15 ltr/menit

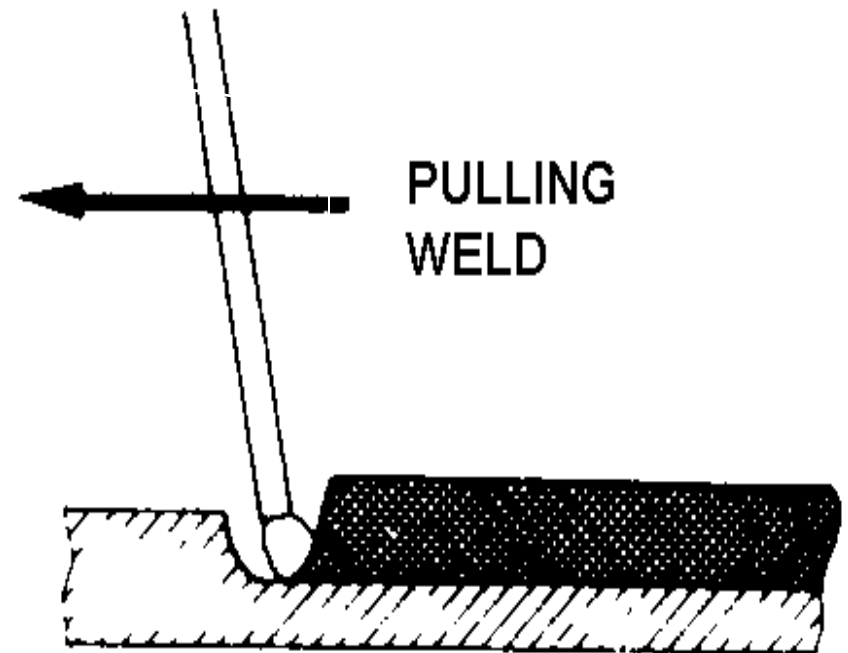
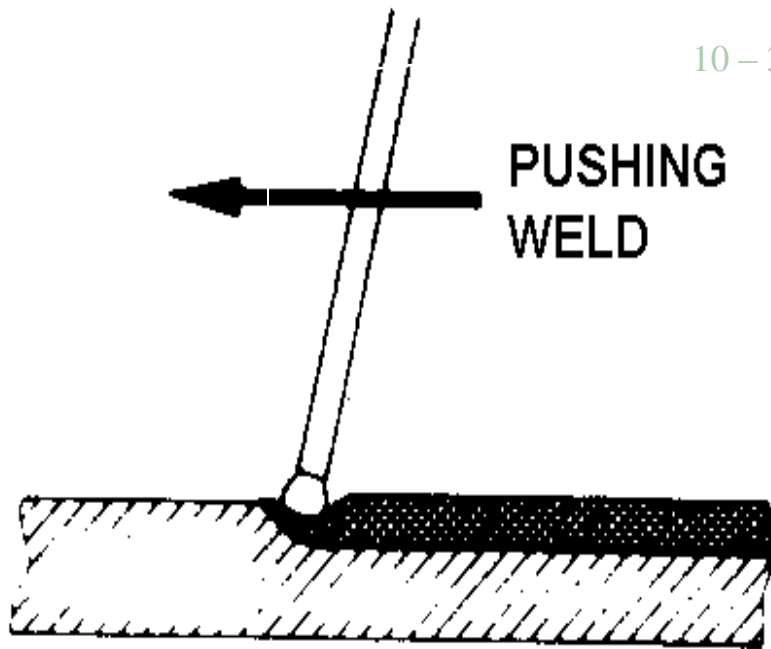
4. Jarak tip ke metal dasar



5. Sudut Torch & Arah Pengelasan

Forehand

Backhand



(Thrusting Method)

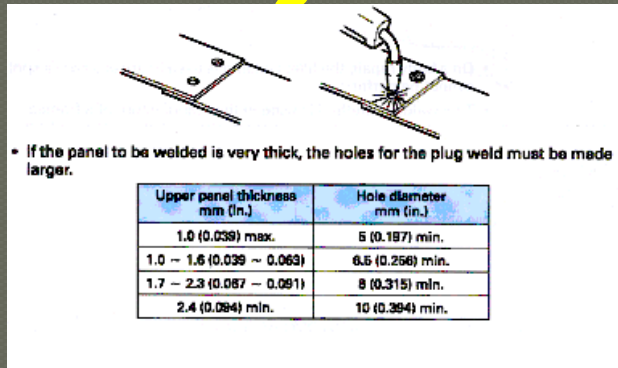
(Drawing Method)

5. Kecepatan Pengelasan

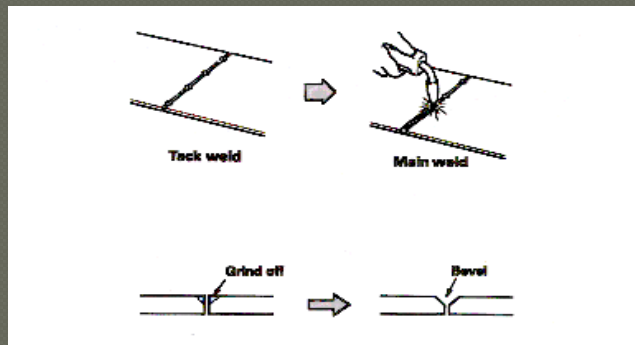
Tebal Pelat (mm)	Kecepatan Pengelasan (Cm/menit)
0.8	105 – 115
1.0	100
1.2	90 - 100
1.6	80 - 85

Metode Pengelasan

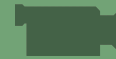
1. Plug Welding



2. Butt Welding

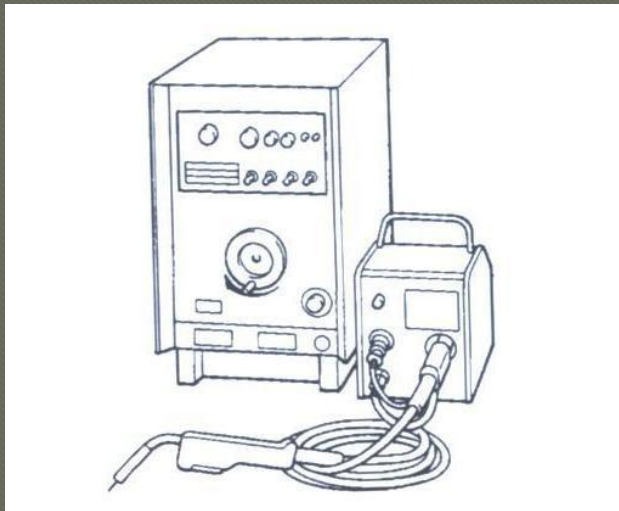


3. Fillet Welding

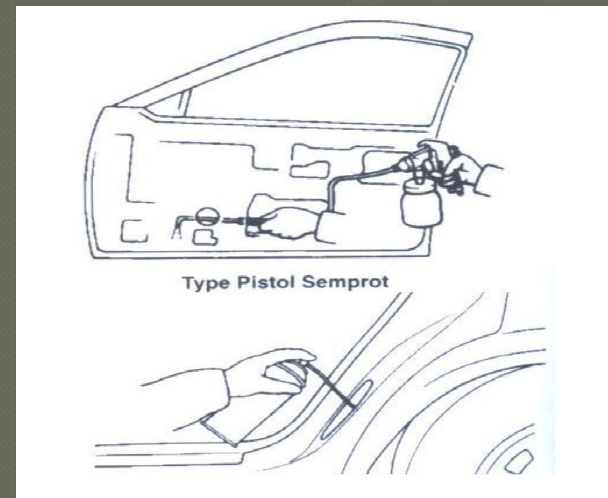


Peralatan Pengelasan

◉ Perangkat Las

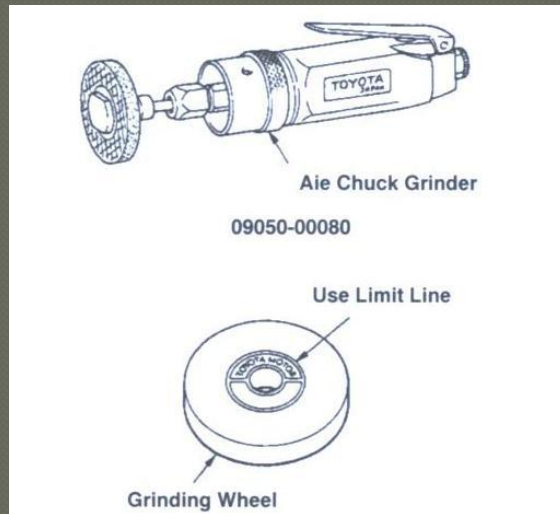


- Bahan anti karat

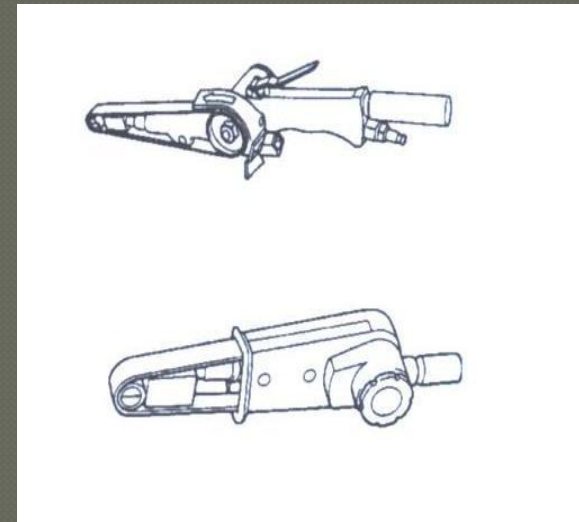


Peralatan Pengelasan

- Air Chuck Grinder



- Belt Sander



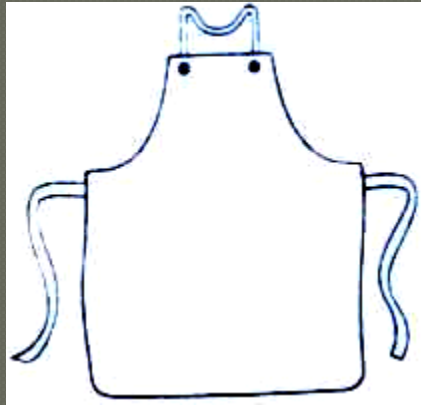
Safety item untuk Pengelasan Shield Face Protecktor



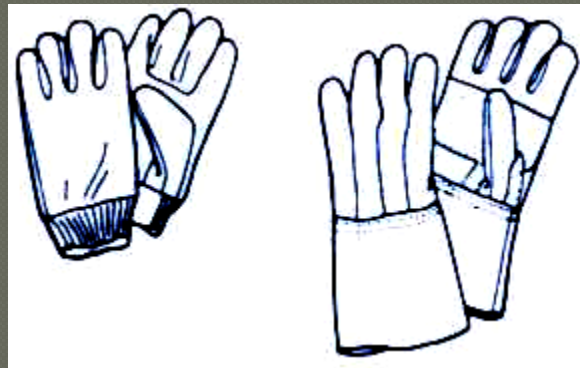
Safety item Pelindung kaki (Legs Cover)



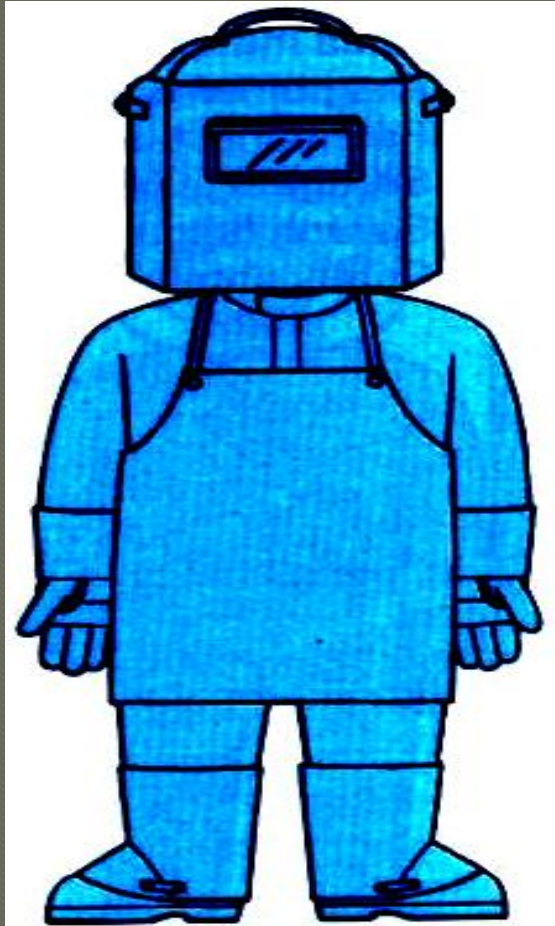
Safety item Fire Proof Apron



Safety item Sarung tangan kulit (Leather Gloves)



Safety Item dipergunakan saat Pengelasan



1. Dust respirator
2. Shield face protection
3. cover
4. Safety Technician uniform
5. Fire proof apron
6. Leather gloves
7. Leg shoes
8. Topi teknisi

Prosedur Pengelasan

● Butt Welding

1. Posisikan panel



2. Siapkan Perangkat Las



3. Lakukan Pengelasan Tack



4. Lakukan Pengelasan Utama



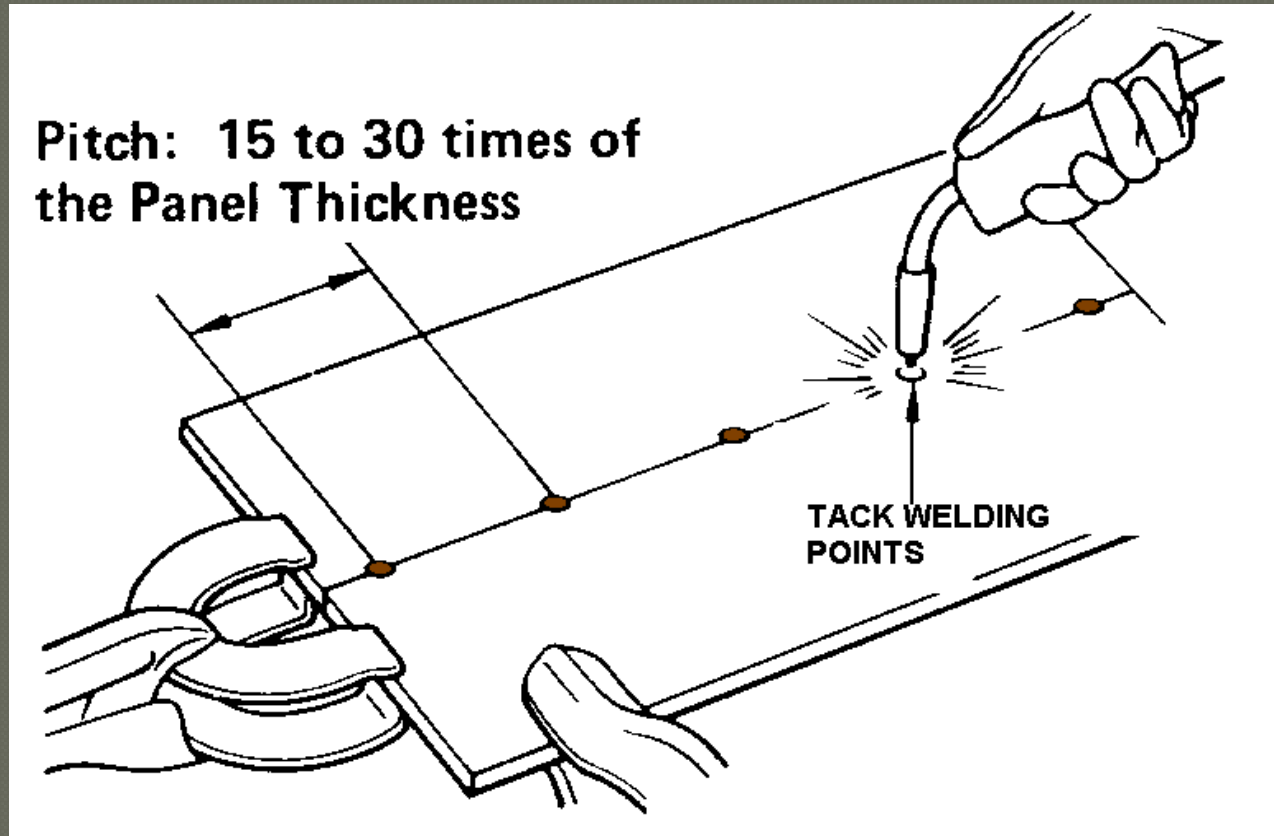
5. Gerinda Ulir-ulir Las



6. Pakai Bahan Anti Karat

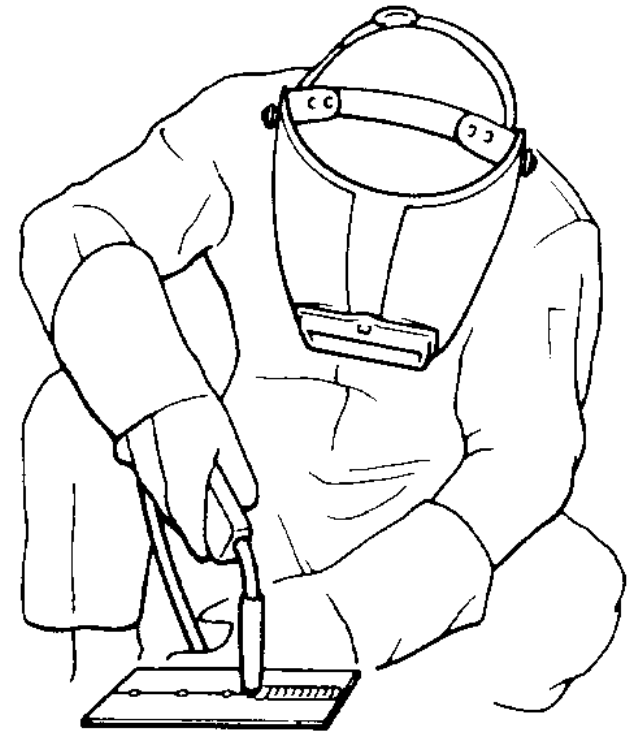
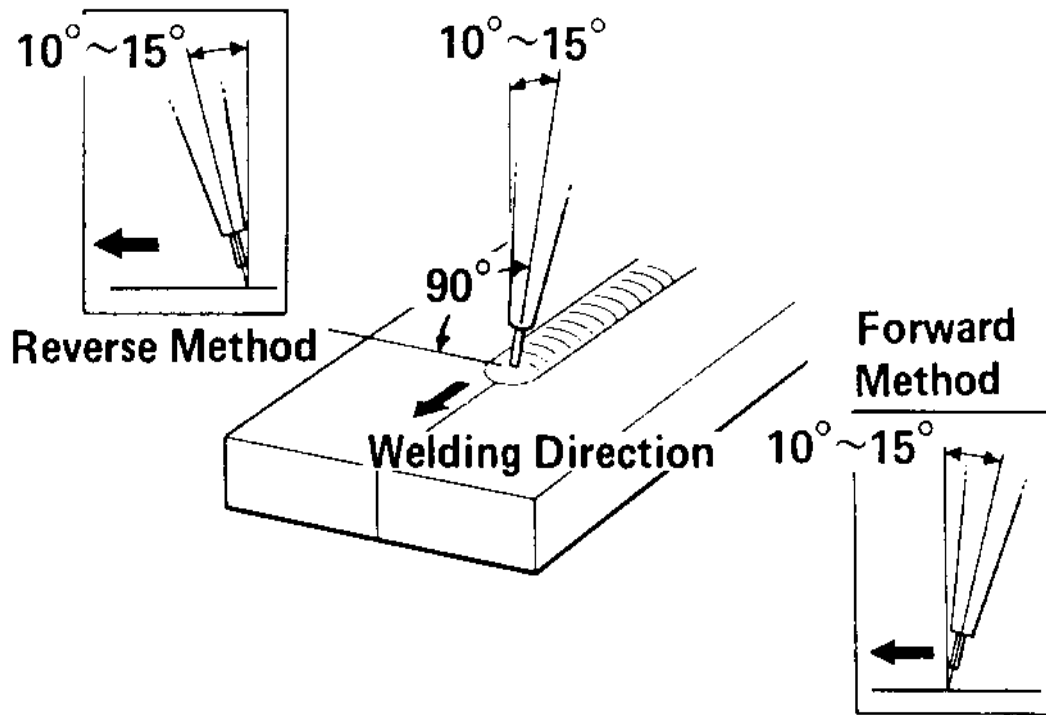
MIG/MAG Welding process

Tack welding



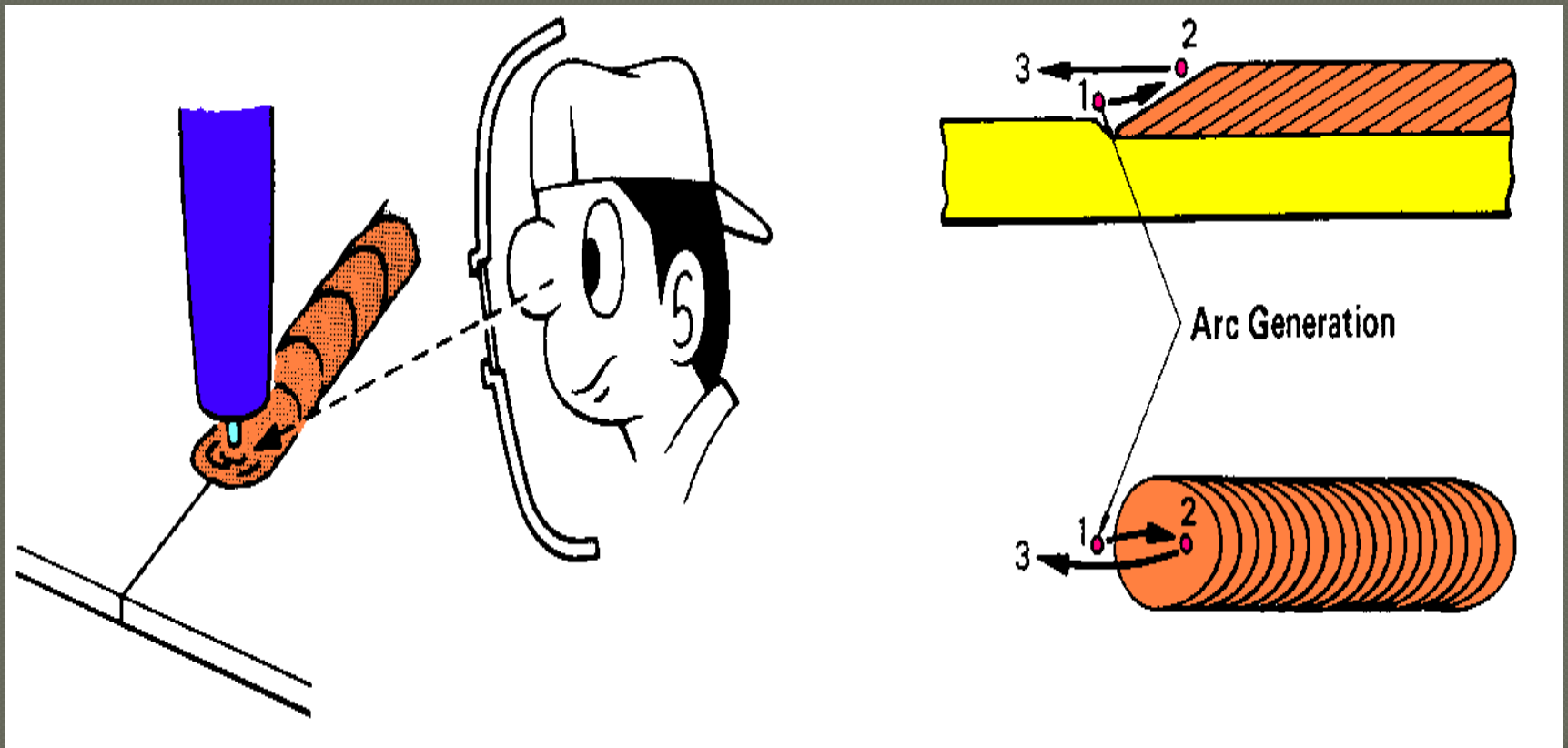
MIG/MAG Welding process

Butt welding



MIG/MAG Welding process

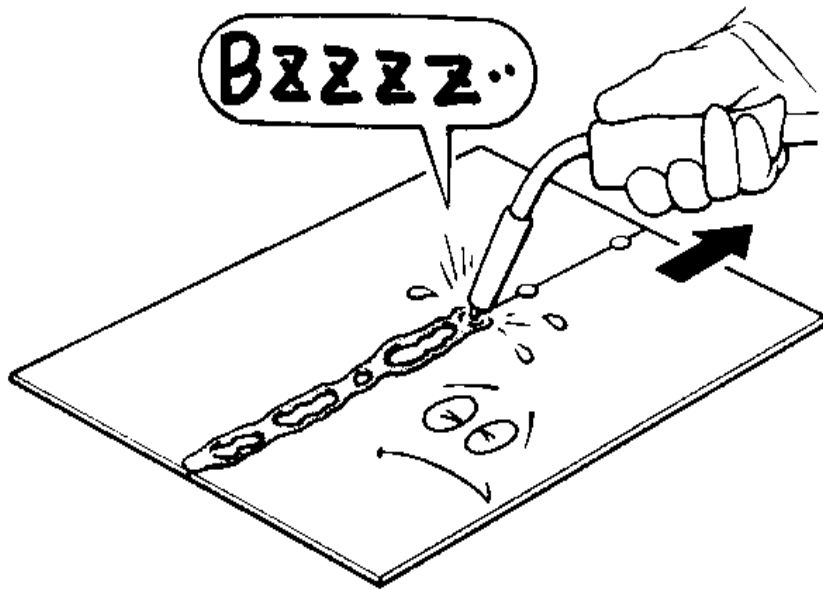
Welding points



Mengurangi penyebaran panas

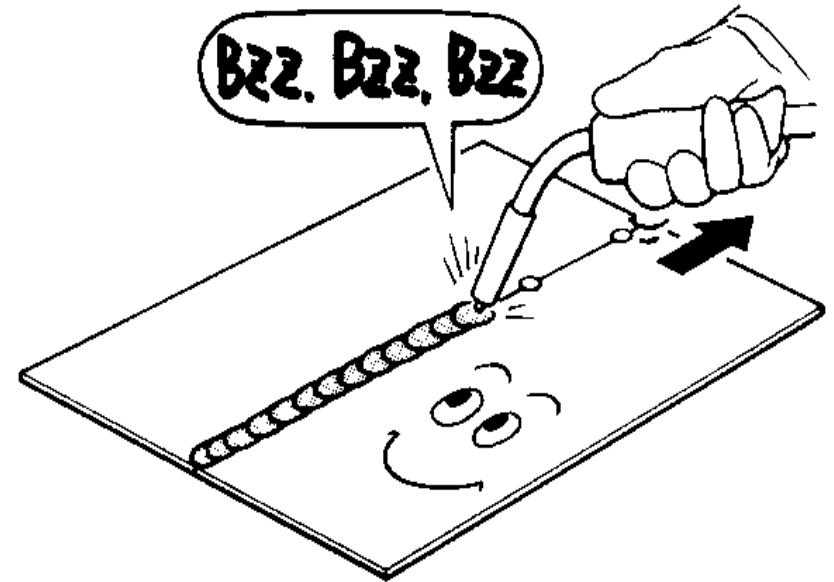
panas

INCORRECT



CONTINUOUS

CORRECT

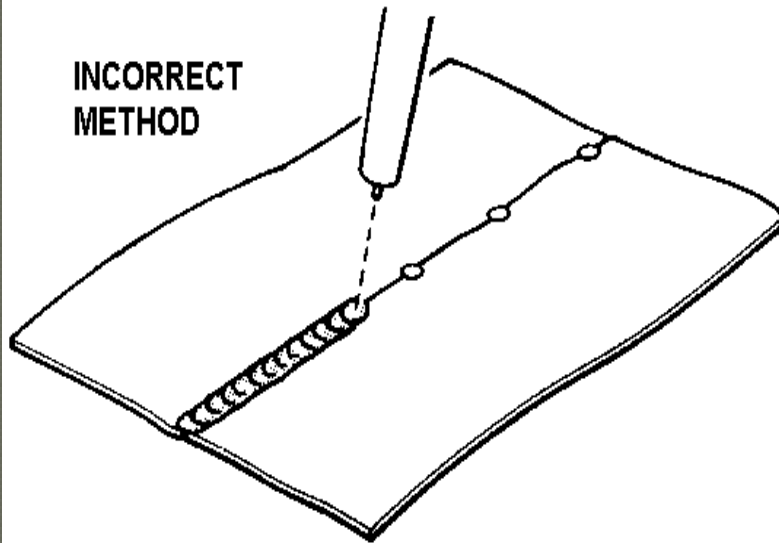


INTERMITTENT

Mengurangi penyebaran panas

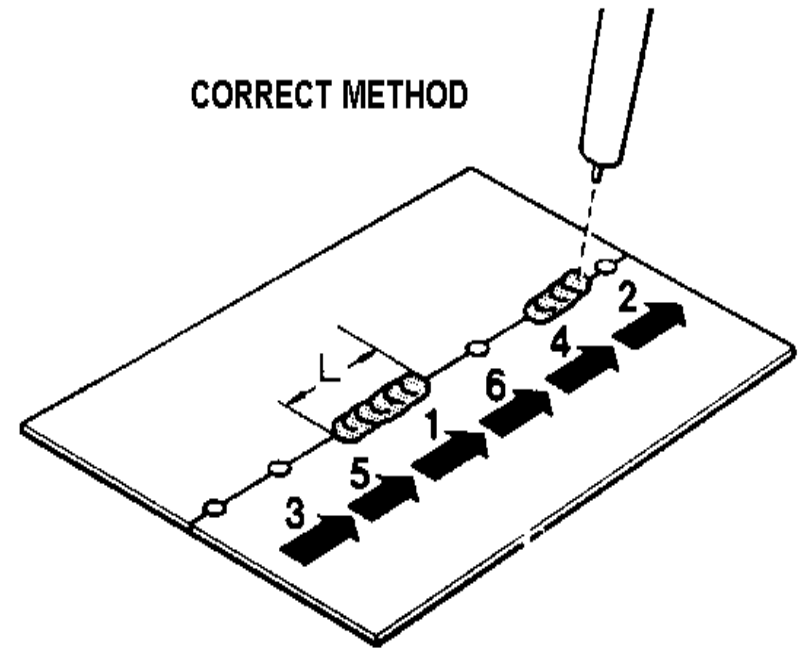
panas

INCORRECT METHOD



If welding is done from the corner, heat will build-up. The result is warping of the metal

CORRECT METHOD



Weld the bead in a straight line at random, lengths always moving to the coolest area for the next weld.

Prosedur Pengelasan

● Plug Weding

1. Membuat Lubang



2. Posisikan Panel



3. Siapkan Perangkat Las



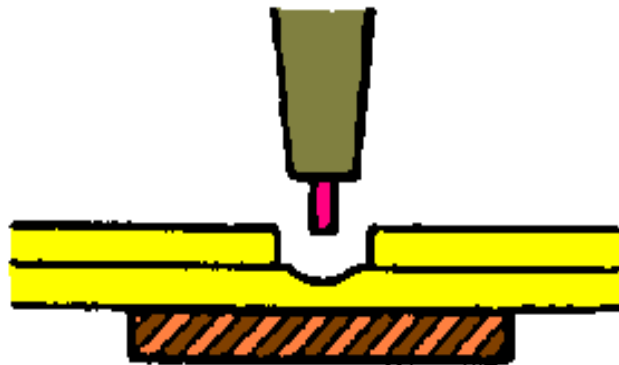
4. Pengelasan



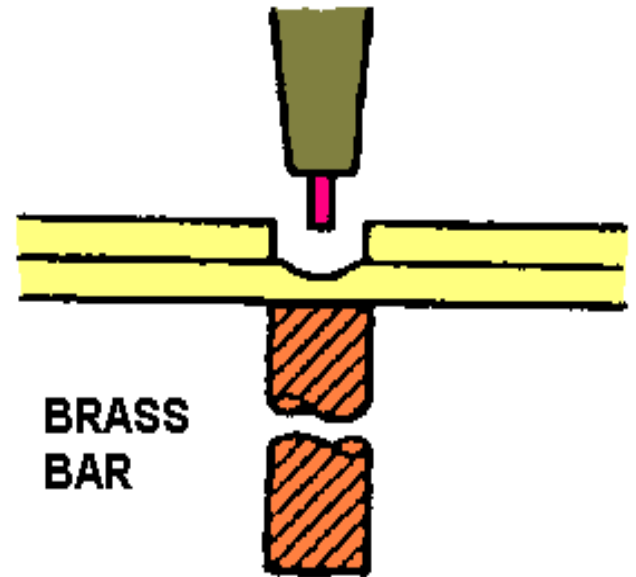
5. Gerinda Titik Las

MIG/MAG Welding process

Plug welding a damaged panel



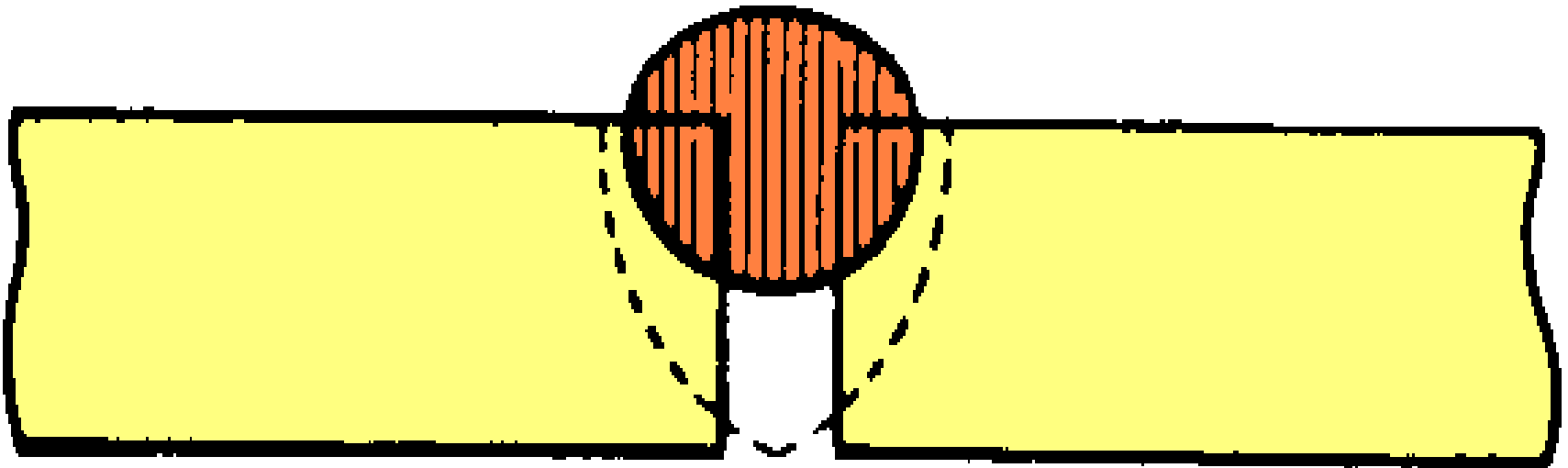
**COPPER OR ALUMINIUM
PLATE**



**BRASS
BAR**

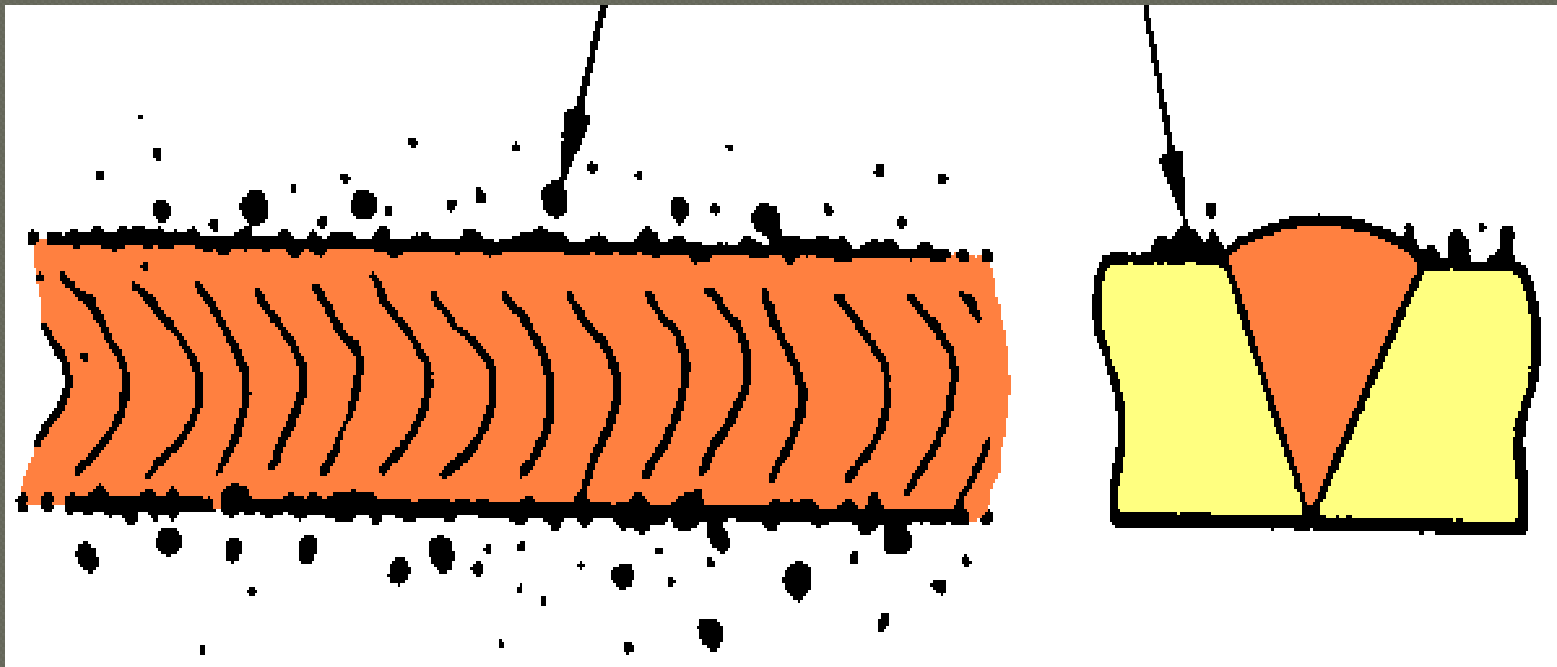
Weld defects

INSUFFICIENT PENETRATION



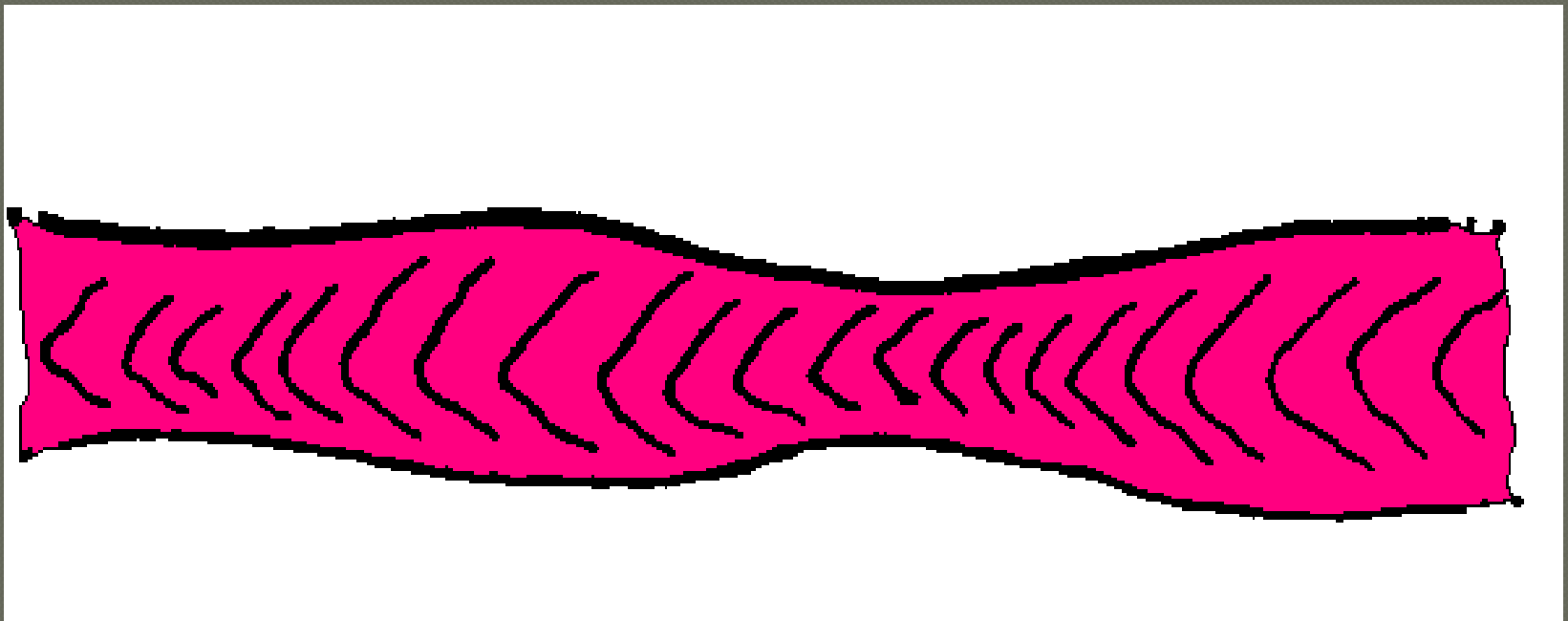
Weld defects

EXCESS WELD SPATTER



Weld defects

IRREGULAR BEAD SHAPE



Weld defects

BURN THROUGH (Terbakar)

