

# **Suggestion System – Nurgianto Adi Putro**



**Membuat  
3 Kombinasi Auto Spot  
Dalam 1 Mesin**

**PT. TOYOTA MOTOR MFG INDONESIA**

# Perkenalan



**Nurgianto Adi Putro**  
Team Leader

1983



2004

Lahir di Jakarta  
tahun 1983  
*Di Tanjung Priuk*



2014

Masuk Toyota tahun 2004  
*Di Line Side Member – Sunter 2*

**Team Project**  
Model 640



2016



Promosi menjadi Team Leader  
*Di Line Side Member – Karawang  
Plant #1*



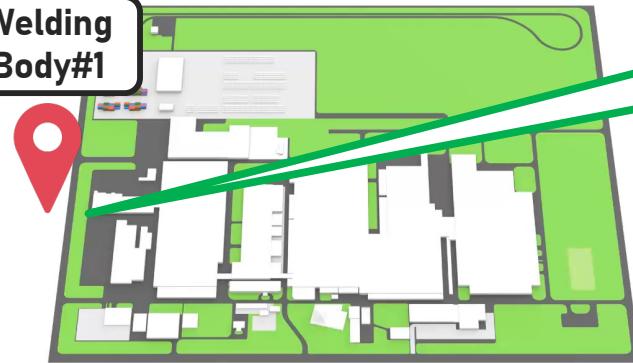
# Tempat kerja



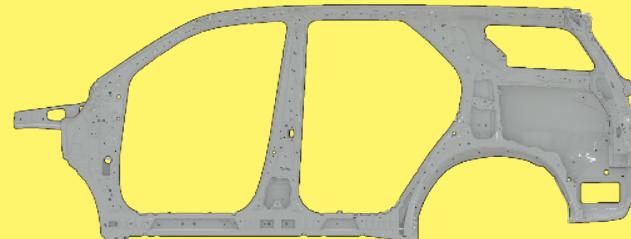
## Lokasi Kerja

- Press Welding Production Division
- Department Welding Body Prod. Plant#1

Welding  
Body#1



## Line saat ini



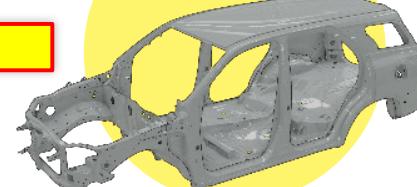
SIDE MEMBER RH

## Under Body



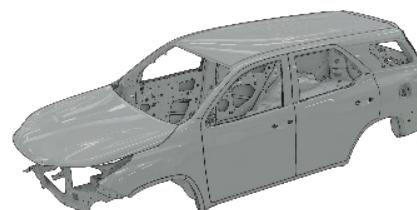
FLOW

## Main Body



FLOW

## Shell Body



## Output Produksi

**FORTUNER**



**INNOVA**

NEW



ALL NEW KIJANG  
**INNOVA**  
ZENIX

# Hoshin Pimpinan Kerja

## President Message



Kami menghasilkan **produk dan layanan berkualitas tinggi yang memuaskan pelanggan**, kontribusi pekerja sangat dibutuhkan, oleh karena itu usahakan tempat mereka bekerja harus nyaman.  
**“Enjoyable Workplace”**

Warih A. Tjahjono  
TMMIN's President Director

## Management's Hoshin



Increase MPEFF dengan reduction Sigma CT dan melalui Balancing job :

- A. **“One Touch Handling concept”**
- B. **“Simple Auto Proses & Robot efficiency Up”**

Arif Mustofa  
Deputy Chief Officer

# Latar Belakang



## Peran saya sebagai team leader

Peran saya adalah memastikan line dengan kondisi baik.



### 1 Persiapan sebelum produksi

- Man** Kehadiran, Kesehatan, Motivasi anggota  
**Material** Kesesuaian WIP, Garansi kualitas material  
**Machine** Running on, Cek NDC  
**Method** Ada perubahan/tidaknya standar kerja

### 2 Mengajar & Menjalankan Standar Kerja

Mengajarkan standar kerja Yang telah dibuat berdasarkan konsep 3S : Safety, Simplicity, Success



Menjalankan standar kerja dan mengobservasinya berdasarkan schedule

### 3 Routine Maintenance



Melakukan perawatan mesin dan 5S line Bersama member

### 4 Response Abnormality



Melakukan control saat produksi berjalan dan merespon to abnormality Bersama member

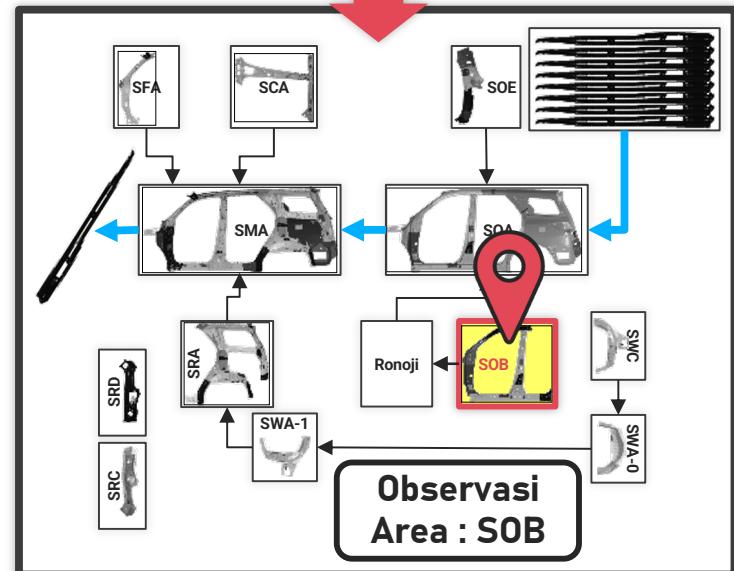


## Schedule Observasi

● = sudah di observasi

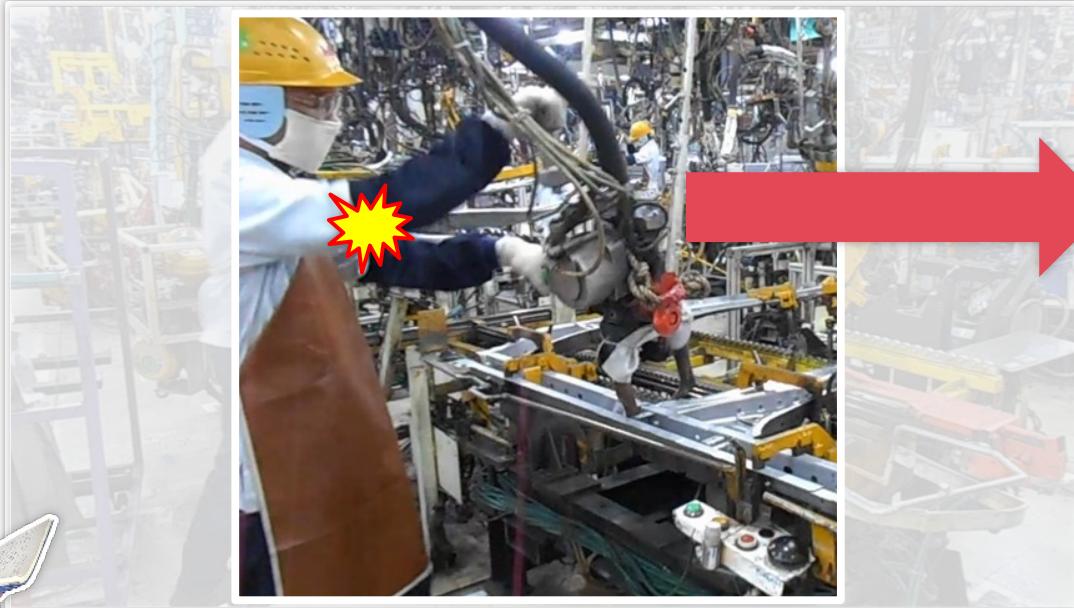
○ = belum di observasi

NO	PROSES	OKTOBER 2022												
		1	2	3	4	5	6	7	8	9	10	11	12	13
1	SFA				●									
2	SCA					●								
3	SMA						●							
4	SOE							●						
5	SOA								●					
6	SOB									○				



# Latar Belakang

Saat mengamati proses SOB, proses spot **manuver gun** spotnya sulit



WRAS : Rank Bc Job

WORK RISK ASSESSMENT SHEET (WRAS)									
Date: 01/01/2024									
Job Title: Welder									
Department: Manufacturing									
Process: Spot Welding									
Risk Level: Bc									
Comments:									
Signature: [Signature]									

WRAS

- Manuver gun berat
- Proses **MURI**
- Ergonomi buruk

Saya harus memperbaiki proses SOB agar lebih nyaman

Benar pak gun nya berat, **tangan dan punggung saya terasa nyeri**

Temporary Action :

Working Ability Gun X dan Gun C proses SOB



Saya lihat kamu sepertinya kesulitan di proses SOB

# Apa itu proses SOB?

- i Proses peng gabungan  
Panel sub assy  
reinforcement inner  
menjadi satu

**MP UPPER**  
Spot Gun C  
Upper = 9 Point

**MP LOWER**  
Spot Gun X  
Lower = 11 Point



Proses kerja JIG SOB Fortuner RH (**Total Point Spot = 20 Point**)

# Komunikasi dengan Leader

Pak Saya ingin memperbaiki proses di SOB area kanan karena ergonominya buruk

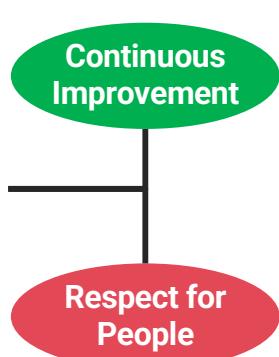
Bagus cepat segera di improve agar member nyaman bekerja



**Haryono**  
Group Leader

## Spirit

**TOYOTA WAY**



Challenge/Tantangan

Kaizen

Genchi Genbutsu

Respect

Teamwork

Bagus... improvement itu  
sesuai dengan hoshin  
management saat ini

Pa... Saya ingin  
membuat auto spot  
di proses SOB.



**Redy L.**  
Section Head



## Strategy

**A**

nalisa proses spot SOB & mencari solusi masalahnya



**B**

uat Schedule dan target penanggulangan



**C**

ari solusi terbaik dengan berkomunikasi dengan bagian lain



**D**

esain penanggulangan



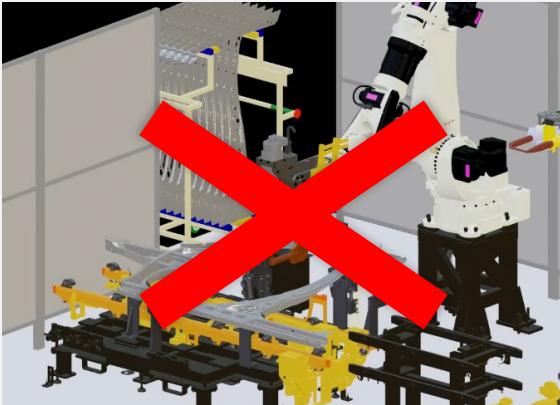
**E**

sekusi dan Evaluasi penanggulangan



# Analisa penanggulangan terbaik

## Alternatif konsep



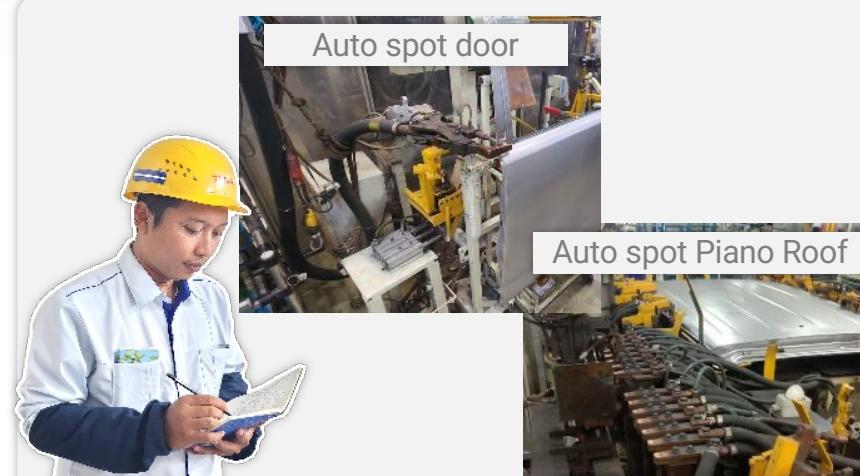
### 1. Instal robot spot

Kelebihan :

1. Akurasi spot presisi di beragam sudut kemiringan
2. Full Automation
3. Teaching adjustable flexible

Kekurangan :

1. Expensive cost
2. Massive Space



### 2. Make auto spot

Kelebihan :

1. Cost lebih murah
2. Slim Area
3. Easy Maintenance

Kekurangan :

Karakteristik spot berbeda beda di setiap proses

Saya akan mengadopsi alternatif ini dengan **melihat karakteristik poin spot di jig SOB**



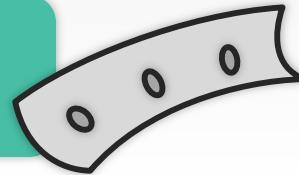
Benchmark ke line lain & menemukan beberapa simple auto spot



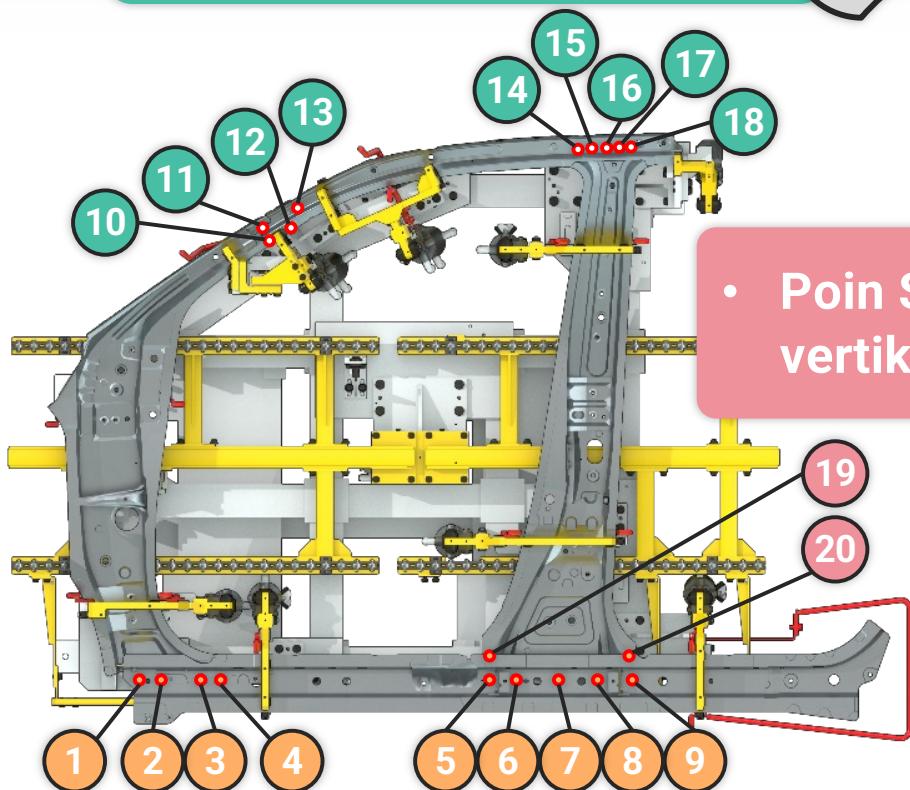
# Analisa karakteristik proses spot SOB

3

- Poin spot dengan kemiringan 15° (9 Poin)

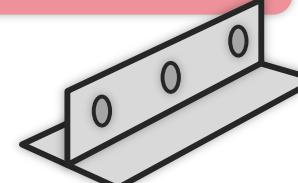


Saya punya ide yang **belum pernah ada** di tempat lain



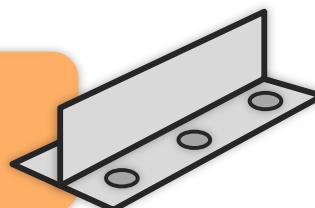
2

- Poin Spot vertikal (2 Poin)



1

- Poin spot datar & lurus (9 Poin)



**Penanggulangan :**  
3 Kombinasi AutoSpot  
Dalam 1 mesin

# Buat schedule dan target penanggulangan



## Jadwal Aktivitas

Planing

Aktual

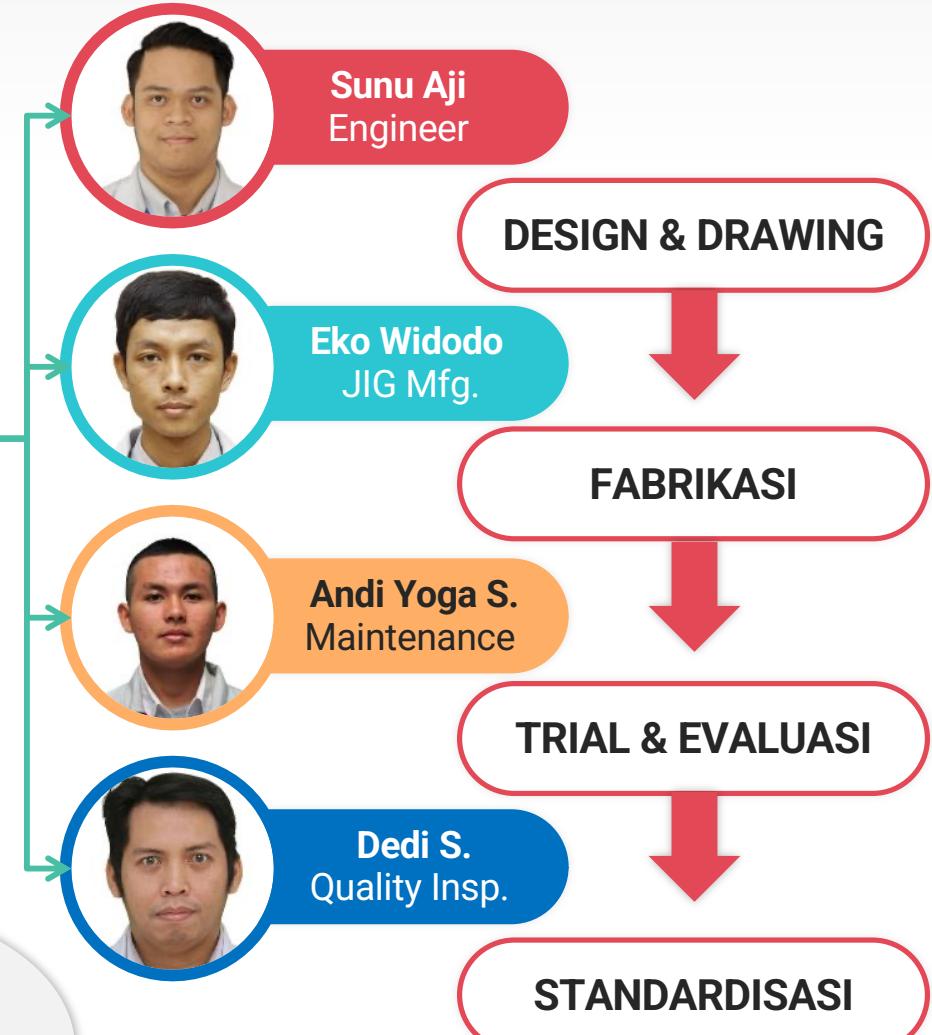
No	Aktivitas	2022				PIC	EVA
		Okt	Nov	Des	Jan		
1	ANALISA PROSES KERJA					NURGIANTO	
2	RENCANA IMPROVEMENT					NURGIANTO	
	• STAKE HOLDER Koord.					SUNU AJI (ENGINEER)	
	• DESIGN (Koord. Drawing)					EKO WIDODO (JIG MFG)	
	• PREPARE MATERIAL					ANDI (MAINT.)	
	• SIMULASI (DEC)						
						Delay : Fabrikasi tidak bisa di hari produksi	
3	FABRIKASI IMPROVEMENT					NURGIANTO, ANDI ( MAINT.)	
4	EVALUASI					NURGIANTO, DEDI (INSPECTION)	
	• TRIAL						
	• PDCA C/M						
	• EVALUASI						
5	STANDARDISASI					NURGIANTO	
6	YOKOTEN KE PROSES LAIN					NURGIANTO	

# Cari solusi terbaik dengan berkoordinasi

## Meeting Koordinasi



Saya punya ide untuk membuat 3 kombinasi auto spot ini pak. tolong bantu realisasinya



# Design Konsep 1 (Spot Lurus)



## Inspirasi



### Permainan Capit Boneka

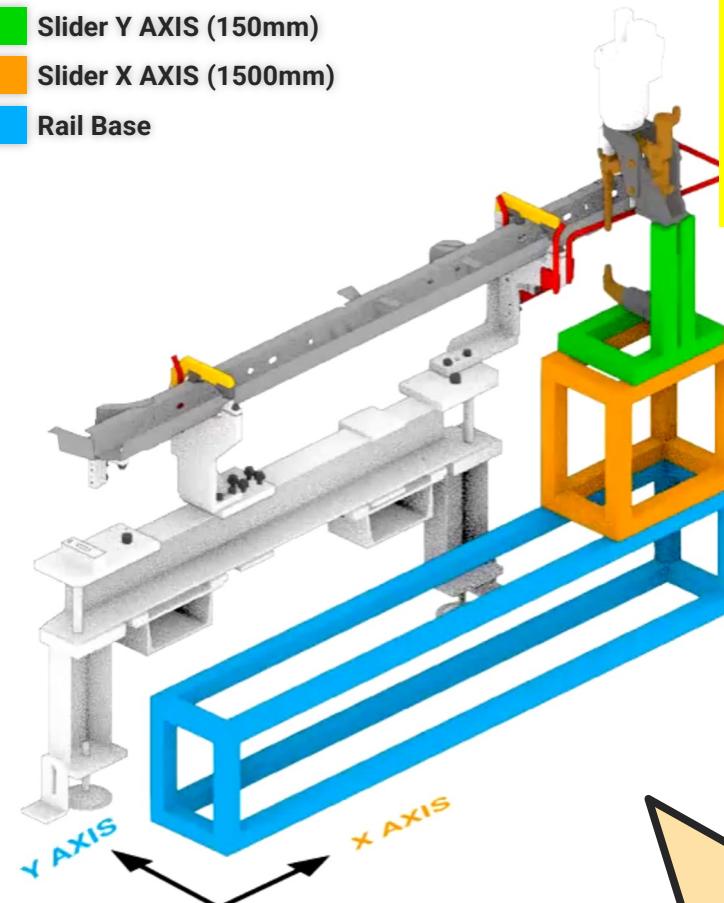
1. Cara kerja mesin penggerak untuk  
**MENENTUKAN POSISI TARGET**



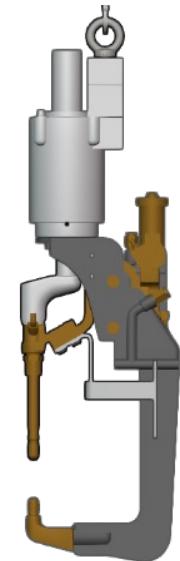
## Material

Item	Qty.
LM Actuator X	1 (1500mm)
LM Actuator Y	1 (150mm)
Rail Base	1 Pcs
Gun Holder	1 Pcs
PLC System	1 Set

- Slider Y AXIS (150mm)
- Slider X AXIS (1500mm)
- Rail Base



**1. Kaizen Cost Saving :**  
Utilize Existing  
Portable Gun C & Travo  
**Rp. 30.000.000,-**



Existing Gun C

**Result : Simulasi Autospot Gun C bisa dilakukan**

# Design Konsep 2 (Spot Vertikal)



## Inspirasi

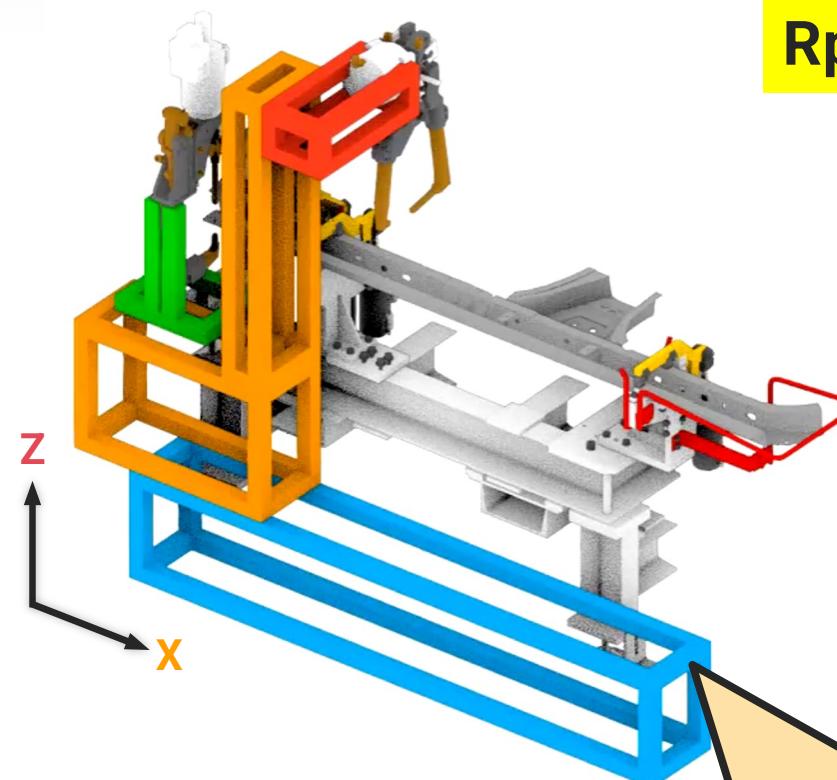


### Permainan Capit Boneka

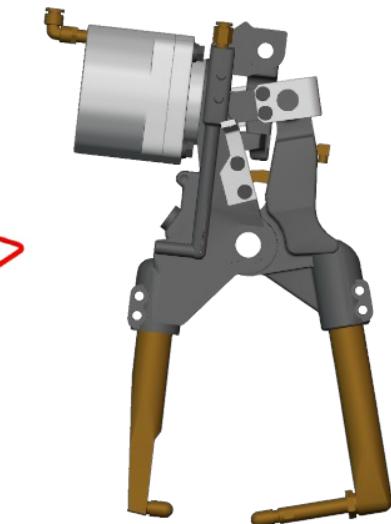
2. Cara kerja capit turun ke bawah untuk meraih target

■ Slider Z AXIS (150mm)

■ Rail Base



**2. Kaizen Cost Saving :**  
Utilize Existing  
Portable Gun X & Travo  
**Rp. 30.000.000,-**



## Material

Item	Qty.
Cylinder 150	1 Pcs
Gun Holder	1 Pcs
PLC System	1 Set

**Result :** Simulasi Autospot Gun X bisa dilakukan

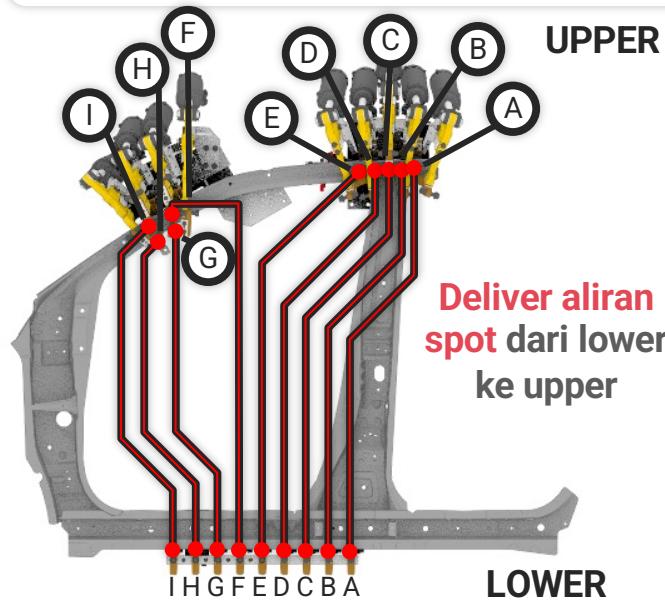
# Design Konsep 3 (Spot miring 15°)

## Inspirasi

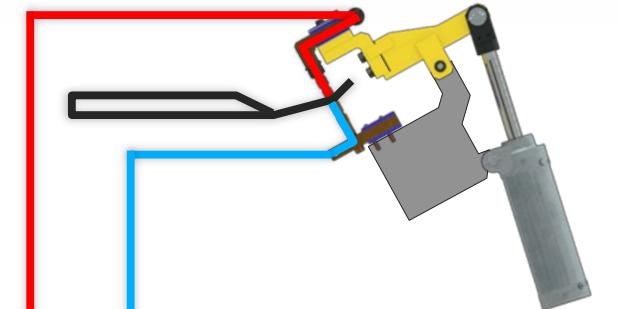
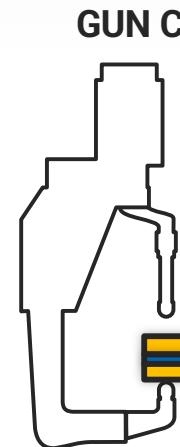


Permainan Capit Boneka

3. Cara kerja untuk TRANSFER/DELIVER dari satu tempat ke tempat lainnya



## Membuat auto spot piano (Piano Spot)



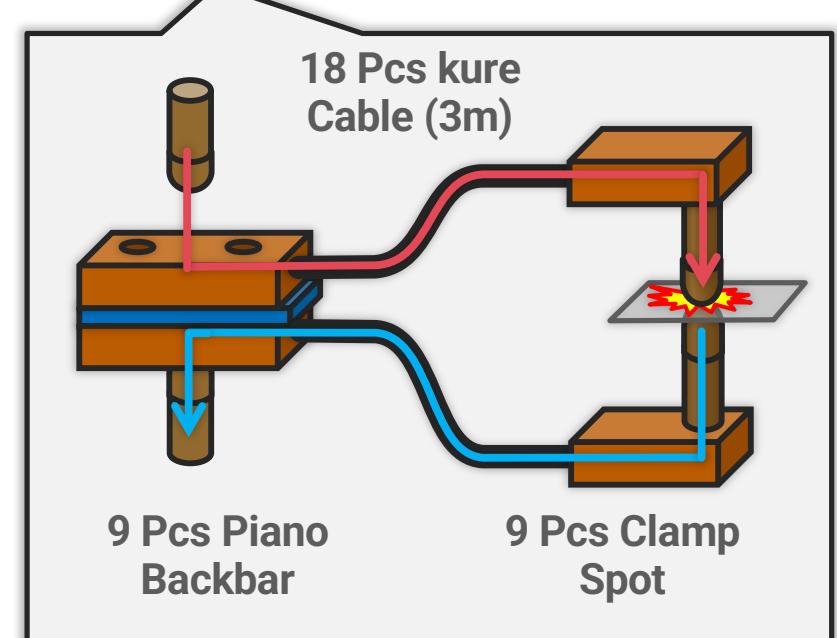
CLAMP SPOT  
UPPER

### Parameter spot piano

BB	CS	Wc (Ka)	Wt (Cy)	P (Kgf)
A	A	8,5	20	100
B	B	9,2	20	100
C	C	9,1	20	130
D	D	9,4	20	100
E	E	9,5	20	90
F	F	9,5	20	180
G	G	9,3	20	100
H	H	9,0	20	100
I	I	9,1	20	100

BB = Backbar

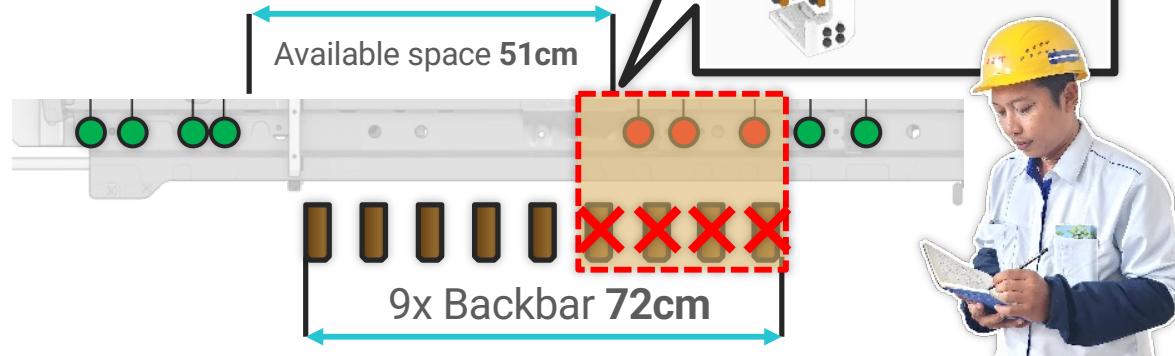
CS = Clamp Spot



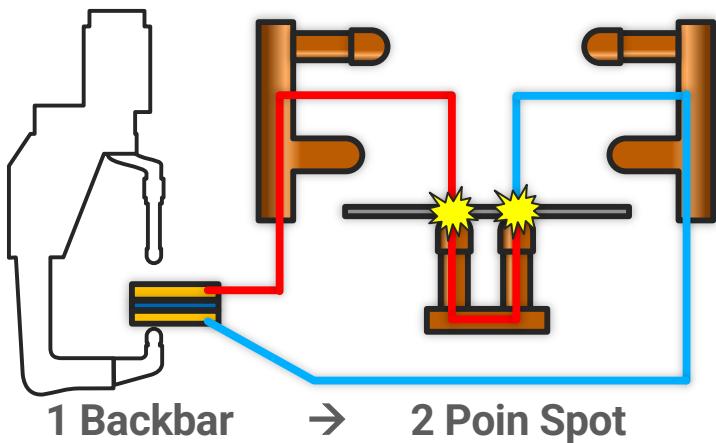
# Multi Spot

## Problem Simulasi :

Point spot interference  
(bertabrakan) dengan  
backbar

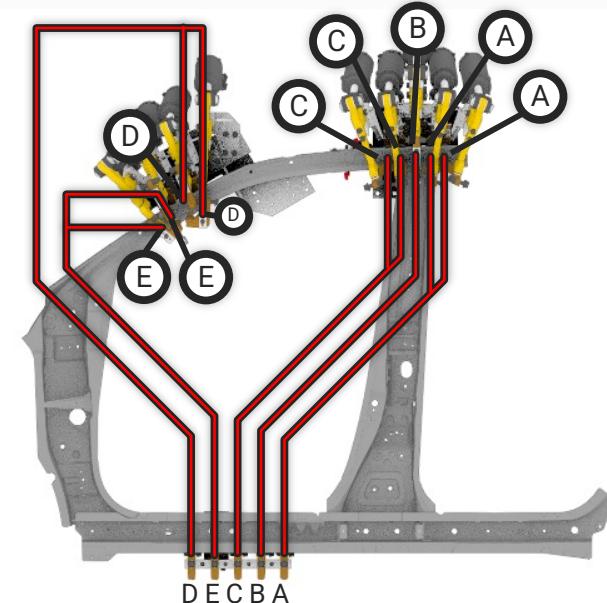


## Membuat multi spot



3. Kaizen Cost Saving :  
Reduce 4 Backbar  
Reduce 8 kure Cable  
**Rp. 12.000.000,-**

**Result :** Backbar berkurang dan tidak  
interference lagi dengan gun spot



## Perubahan Parameter

BB	CS	Wc (Ka)	Wt (Cy)	P (Kgf)
A	A	8,5 ➤ 9,0	20	100
	A	9,2 ➤ 9,0	20	100
B	B	9,1 ➤ 8,7	20	130
	C	9,4 ➤ 9,3	20	100
C	C	9,5 ➤ 9,3	20	90
	D	9,5 ➤ 8,7	20	180
D	D	9,3 ➤ 8,7	20	100
	E	9,0 ➤ 8,7	20	100
E	E	9,1 ➤ 8,7	20	100

BB = Backbar CS = Clamp Spot

# Eksekusi Improvement

## Instalasi improvement



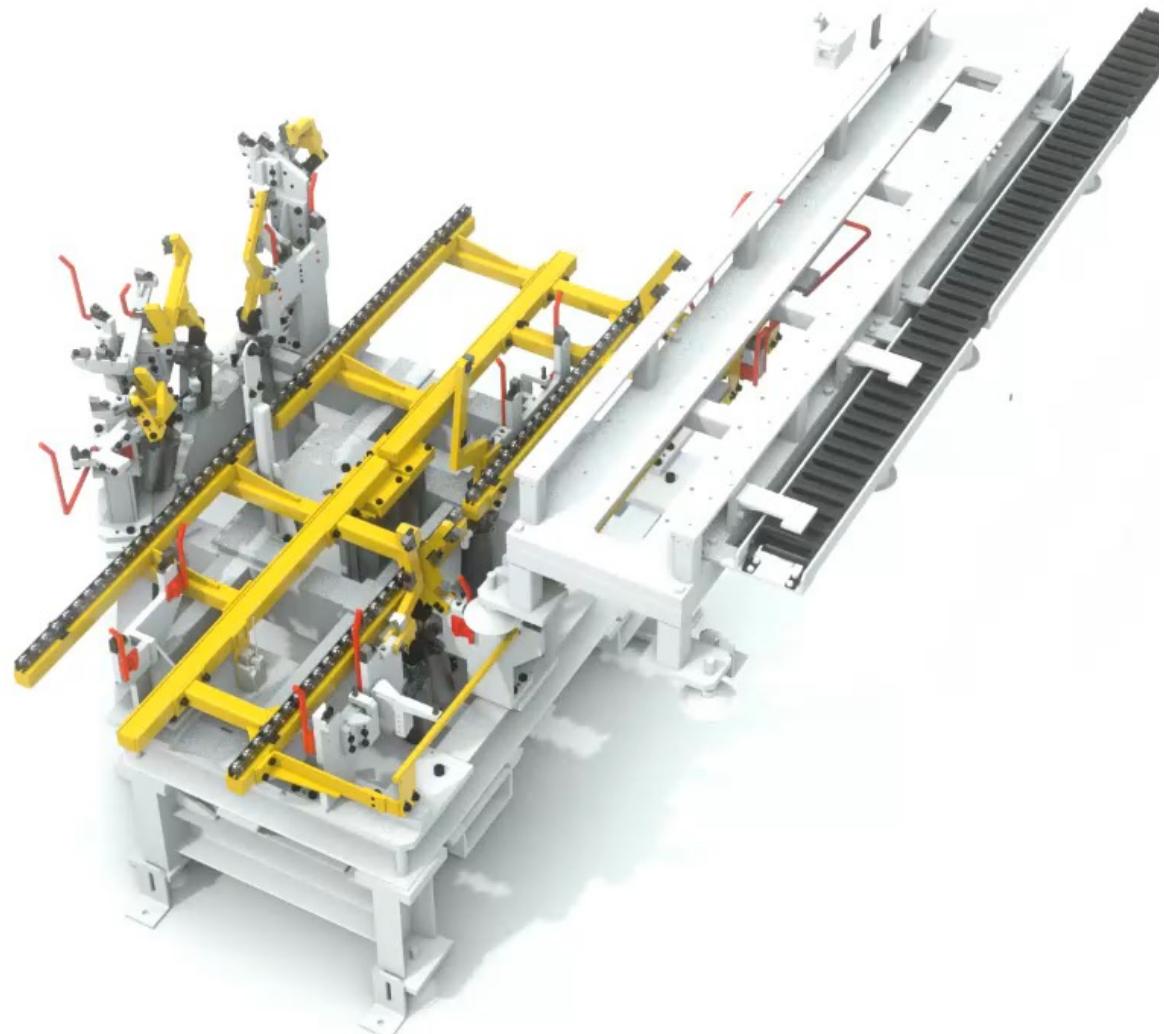
Nurgianto  
Conceptor



Eko Widodo  
JIG Mfg.

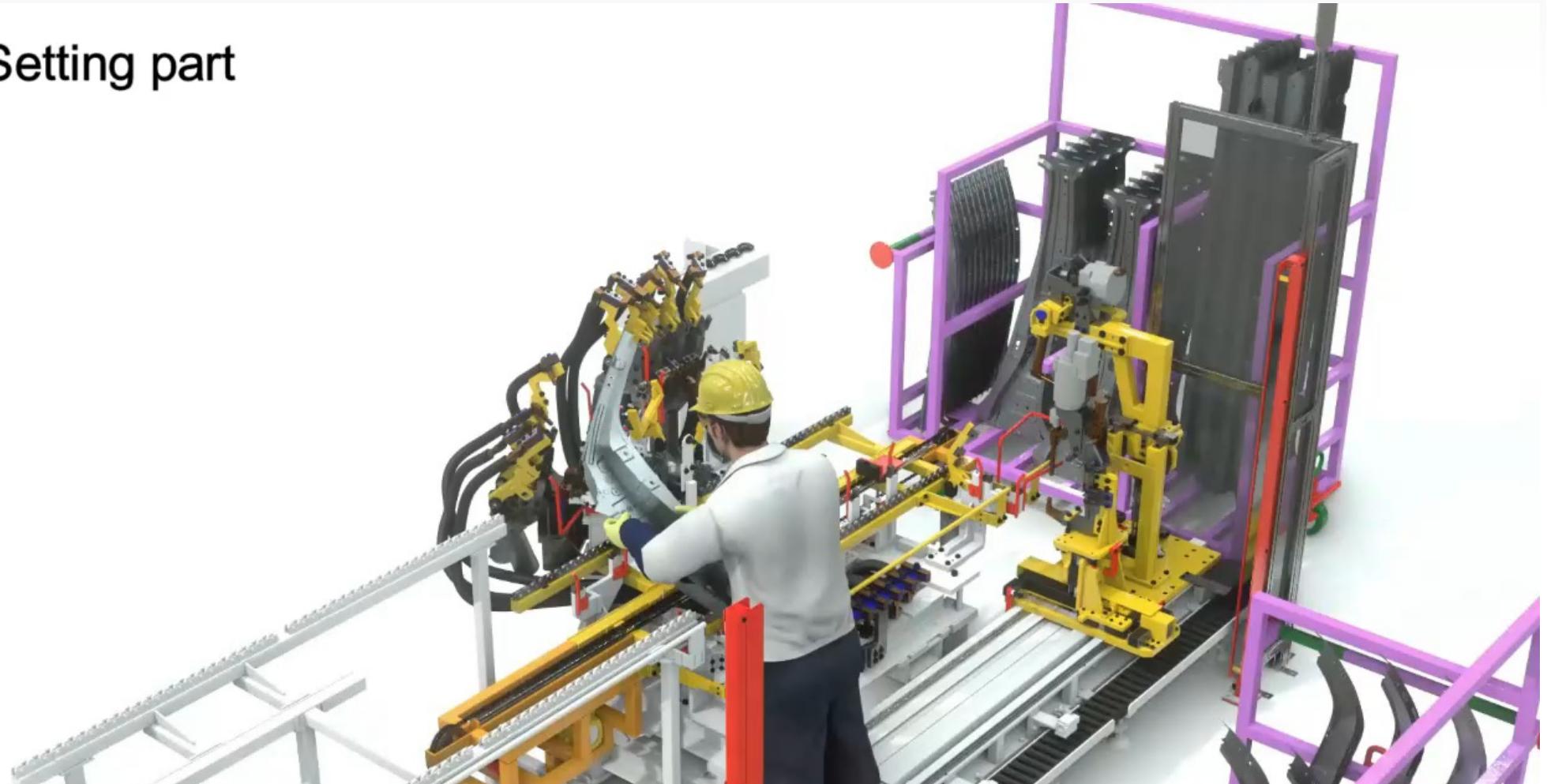


Andi Yoga S.  
Maintenance



# Cara Kerja Improvement

Setting part



Spot Datar

Spot Miring

Spot Datar

Spot Vertikal

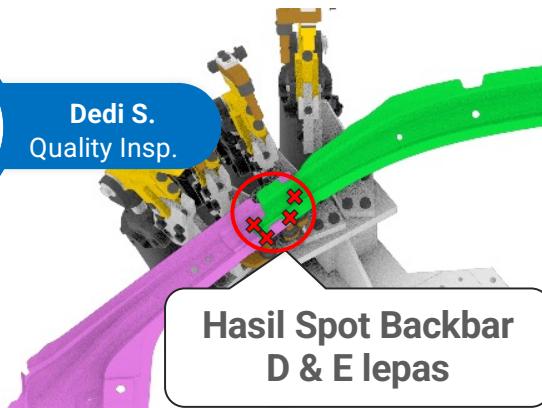
Setting Part	PB	Clamp	Auto Spot Gun C 5 Poin Spot	Auto Multi Spot Piano 5 Poin = 9 Poin Spot	Auto Spot Gun C 4 Poin Spot	Auto Spot Gun X 2 Poin Spot	Hom post	Un Clamp	Auto transfer to Ronoji
--------------	----	-------	--------------------------------	---	--------------------------------	--------------------------------	----------	----------	----------------------------

# PDCA#1

## Problem



Dedi S.  
Quality Insp.



## Rootcause

Kure cable terlalu  
Panjang (3 meter)

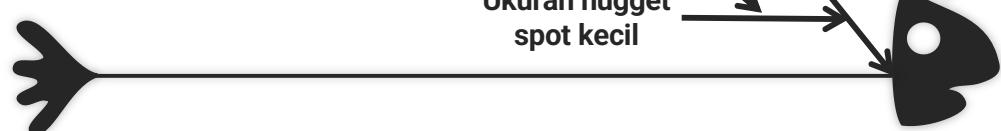
Output Welding  
Curent kurang

Mesin

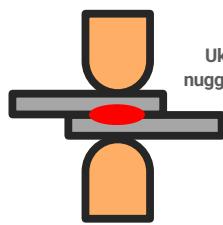
Hasil Spot  
Backbar D&E  
lepas

Tahanan terlalu  
besar

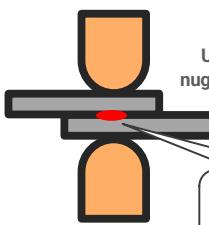
Ukuran nugget  
spot kecil



## Ilustrasi Problem



Ukuran nugget ideal



Ukuran nugget kecil

Ideal

Actual

Welding  
Current  
kurang

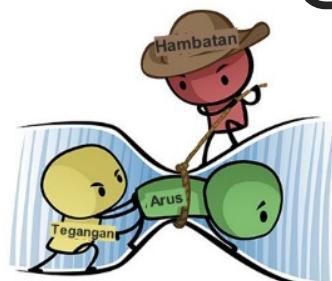
BB	CS	Wc (Ka)	Wt (Cy)	P (Kgf)
D	6	8,7	20	180
	7	8,7	20	100
E	8	8,7	20	100
	9	8,7	20	100

## Penanggulangan PDCA #1

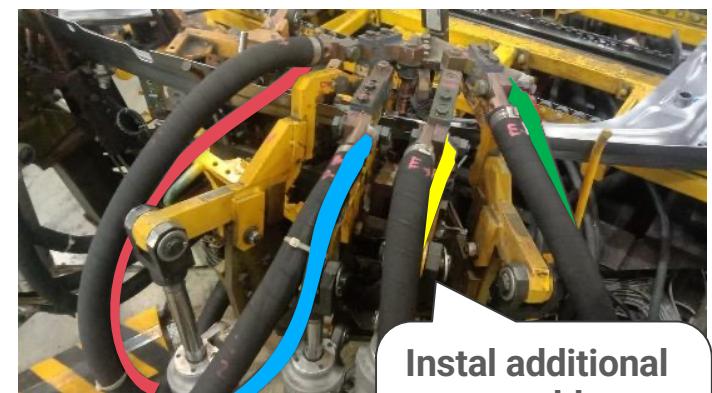
Hukum Ohm

1. Memendekkan Kabel

2. Pararel kabel



Untuk menaikan arus  
tahanan harus dikecilkan,  
ada 2 cara yaitu :



Result : Welding Current meningkat dan  
hasil spot piano tidak lepas

Instal additional  
power cable  
pararel existing  
cable 9.5 mm

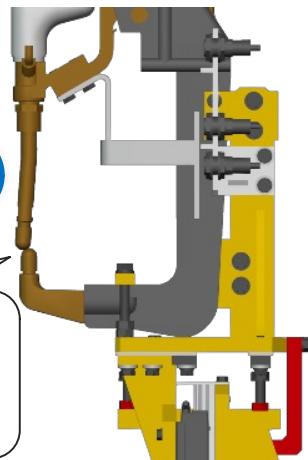
# PDCA#2

## Problem



Dedi S.  
Quality Insp.

Spot lepas karena  
Sunktip atas Gun C  
bengkok



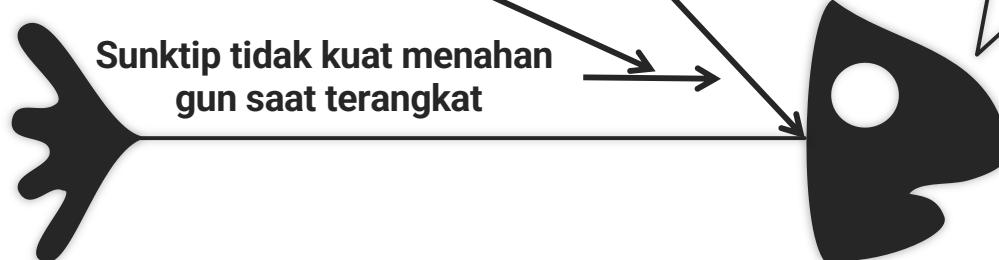
## Rootcause

**Titik beban rangkaian gun ada di sunktip**

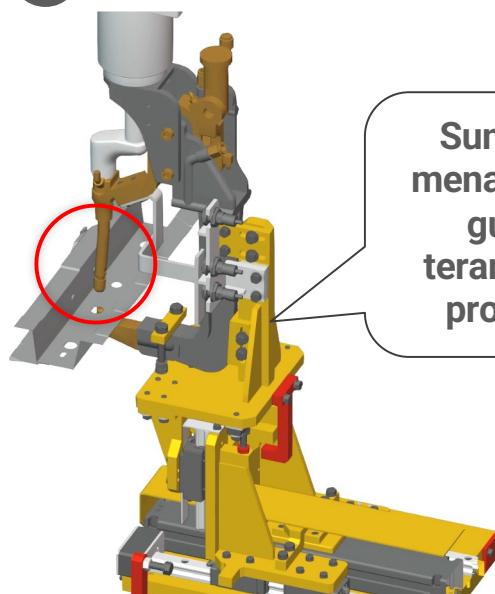
Mesin

Sunktip tidak kuat menahan  
gun saat terangkat

**Sunktip atas Gun C bengkok**



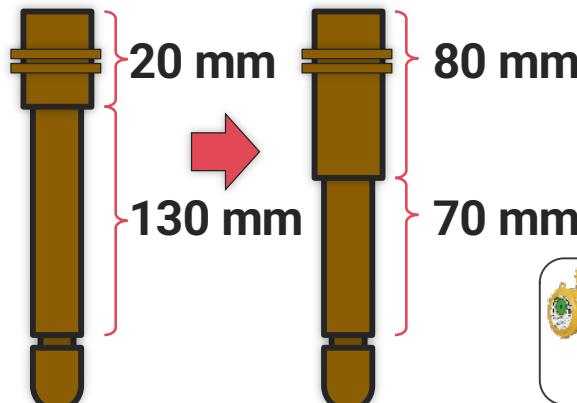
## Ilustrasi Problem



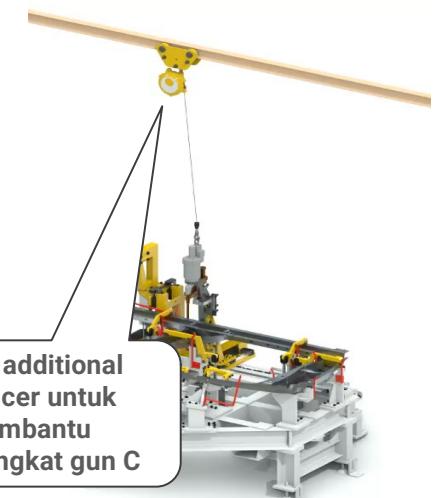
Sunktip atas  
menahan beban  
gun yang  
terangkat saat  
proses spot



## Penanggulangan PDCA #2



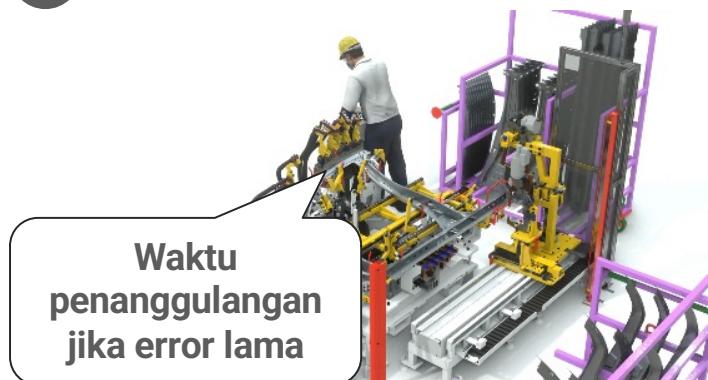
Instal additional  
balancer untuk  
membantu  
mengangkat gun C



**Result :** Sunktip atas bengkok tertanggulangi dan  
problem spot lepas tidak terjadi lagi

# PDCA#3

## Problem



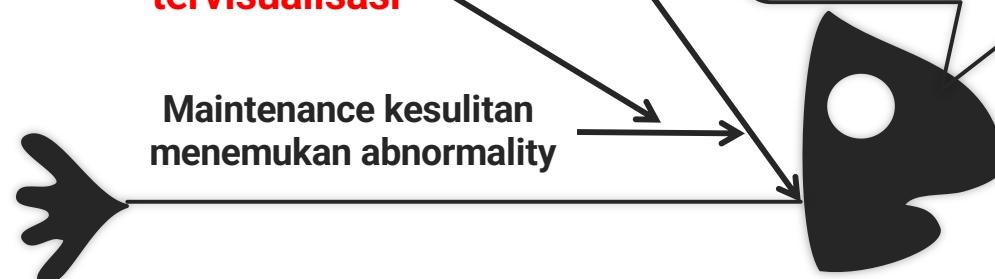
## Rootcause

Problem tidak tervisualisasi

Mesin

Waktu penanggulangan jika error lama

Maintenance kesulitan menemukan abnormality



## Ilustrasi Problem



## Penanggulangan PDCA #3



**Result :** Setiap ada abnormality system auto spot lebih cepat ditanggulangi

# Video Improvement

**BEFORE**



Proses spot SOB Fortuner RH  
terdapat kesulitan proses

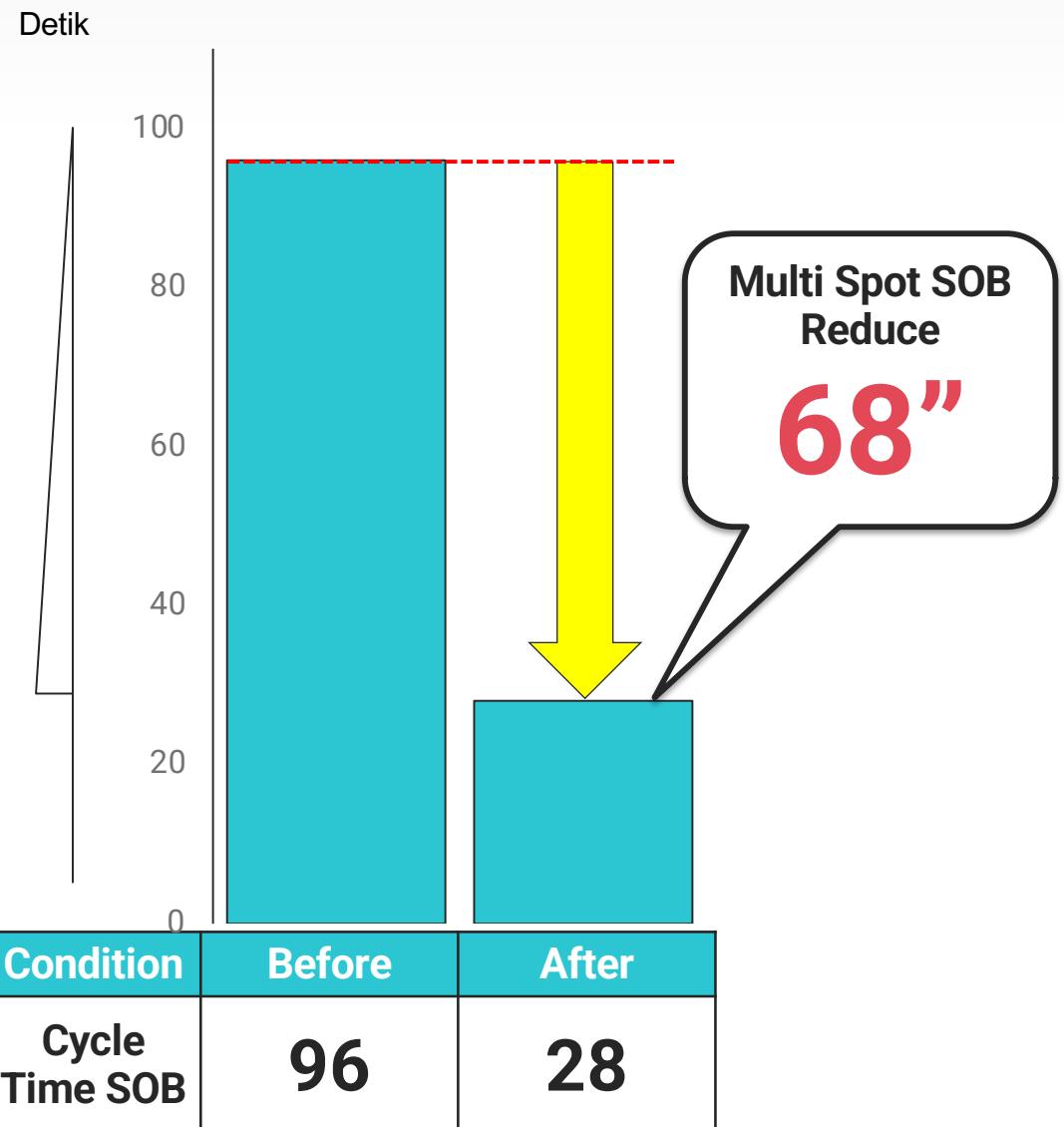
**AFTER**



Proses spot SOB Fortuner RH Full  
auto hanya setting part saja

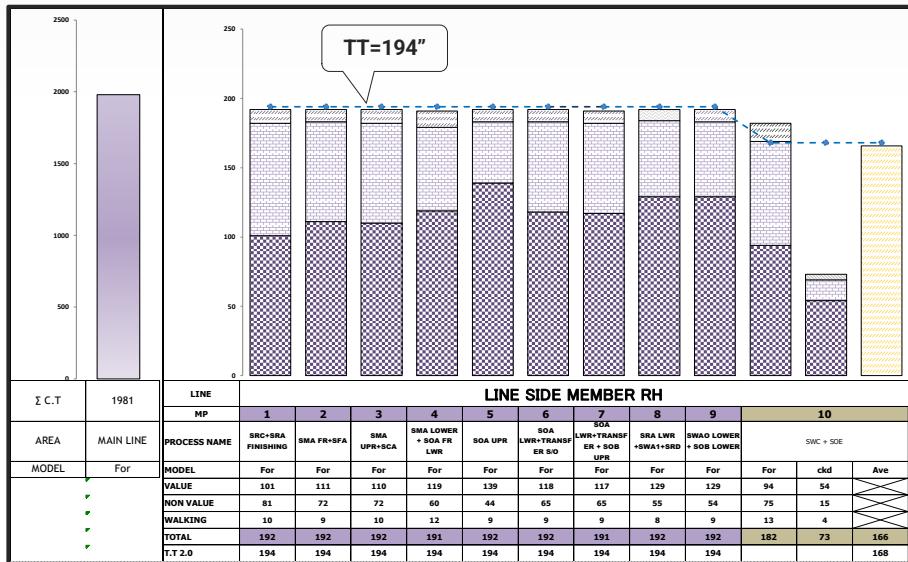
# Evaluasi Hasil Improvement

## Rank down hazard

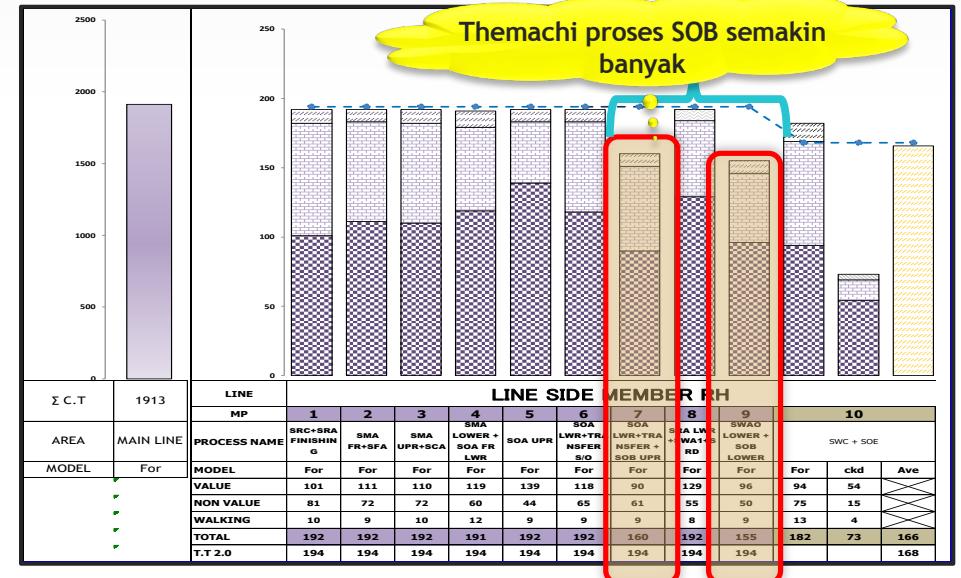


# Line Performance after Improvement

## YAMAZUMI BEFORE FORTUNER



## YAMAZUMI AFTER FORTUNER



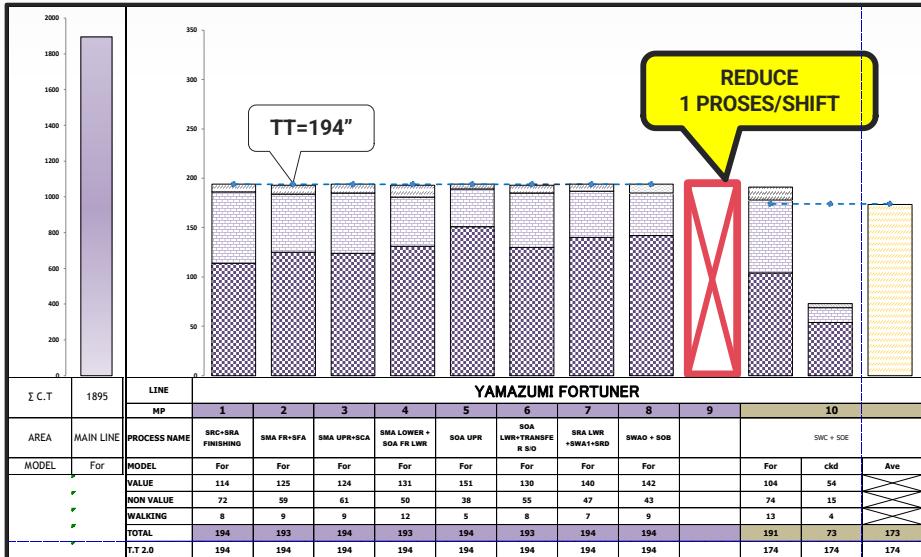
## MPEFF FORTUNER GROUP

Line	Group									Takt Time	Man Power		MPEFF								
											Calculate	Sett.									
S/M RH & MAIN BODY	CMPV	cmpv soa,sma,sca,soe	2891	560-B	660-A	650-A	CMPV	Fort	CKD	Serv. Part	Load Ave	1831	0	0	0	1831	4.37	6.99	7	99.8%	O
		cmpv Sub Assy RH		1060	0	0	0	0	0	0	0	910	3.82	3.97	4	99.2%	O				
	Fortuner	Fortuner soa,sma,swc,src,sob, soe		0	1732	0	0	0	0	0	0	1732	3.40	8.48	9	94.2%	X				
		Fortuner + ckd Sub Assy RH		0	181	98	0	0	0	0	0	165	2.75	1.00	1	100.0%	O				
SM RH		4804	2891	1913	98	0	4638			20	21				97.3%						

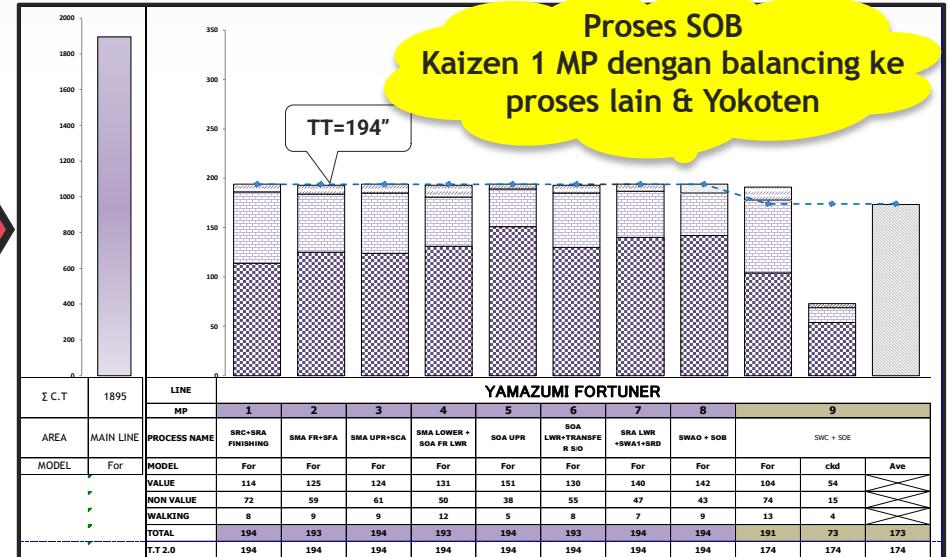
MPEFF turun  
sehingga saya  
harus melakukan  
**Balancing Job dan  
Kaizen MP**

# Line Performance after Improvement

## YAMAZUMI FORTUNER AFTER BALANCING



## YAMAZUMI FORTUNER AFTER



## MPEFF FORTUNER GROUP

Line		Group								Takt Time	Man Power		MPEFF
			560-B	660-A	650-A	CMPV	Fort	CKD	Serv. Part		Calculate	Sett.	
S/M RH & MAIN BODY	CMPV	cmpv soa,sma,sca,soe	2891	1895	1831	0	0	0	1831	4.37	6.99	7	99.8%
		cmpv Sub Assy RH			1060	0	0	0	910	3.82	3.97	4	99.2%
	Fortuner	Fortuner soa,sma,swc,src,sob, soe			0	1714	0	0	1714	3.62	7.90	8	98.7%
		Fortuner + ckd Sub Assy RH			0	181	98	0	165	2.75	1.00	1	100.0%
SM RH			4786		2891	1895	98	0	4620	20	20		99.3%

Proses Fortuner Lebih Smooth dan MPEFF meningkat



# Evaluasi Hasil



Dampak terhadap factor **S,Q,P,C,Hr**

No	Factor	Before	After	Result
1	<b>S</b>	WRAS : Proses SOB Fortuner RH Rank Bc	WRAS : Proses SOB Fortuner RH Rank Cc	<b>WRAS : Proses SOB Fortuner RH Rank down Bc → Cc</b>
2	<b>Q</b>	Ada potensi Cripple Spot By Manual proses	BIQ by Auto Counting Spot + Display	<b>0 Defect Cripple Spot SOB Fortuner RH</b>
3	<b>P</b>	MP EFF : 97% CT 96"	MP EFF : 100% CT 28"	<b>MP EFF NAIK MENCAPI TARGET REDUCE CT 68"</b>
4	<b>C</b>	TOTAL MP FORTUNER <b>10 MP/SHIFT</b>	<u>REDUCE MP 10 MP → 9 MP</u> MH MP/Year = Rp. 253.378.752 Reduce 1 MP / Shift (total 2 MP) Total Reduce = 2 x Rp. 253.378.752 <b>= Rp 506.757.504</b> <u>IMPROVEMENT</u> MATERIAL AUTO SPOT SOB 650 = Rp 314.501.500,- X 1SET <b>= Rp 314.501.500</b>  MH IMPROVEMENT = 2MP X 8Day X 8H X Rp 119.971 <b>= Rp 15.356.288</b>  TOTAL COST IMPROVEMENT = Rp 314.501.500 + Rp 15.356.288 <b>= Rp 329.857.788</b>	<b>NQI COST IMPROVE</b> = REDUCE 2 MP - COST IMPROVEMENT = Rp 506.757.504 – Rp 329.857.788 <b>= Rp 176.899.716,-</b> <b>Di tahun pertama</b>
5	<b>HR</b>	Skill & Knowledge terkait Pneumatik & PLC masih Rendah	Skill & Knowledge meningkat Improvement Pneumatik, PLC	Meningkatkan Skill Improvement

# Standardization



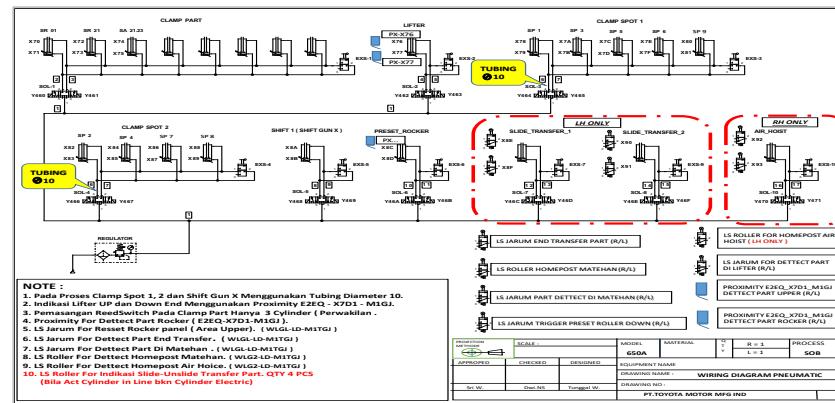
PT. TOYOTA MOTOR MFG.  
INDONESIA  
NT : WELDING PROD 1  
: MAIN BODY W  
: SIDE MEMBER RH

## MATERIAL

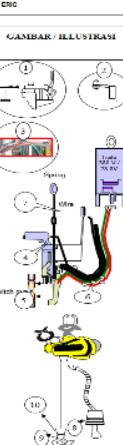
PERAWATAN

# STANDARDISASI AUTO SPOT SOB RH FORTUNER

WIRING DIAGRAM

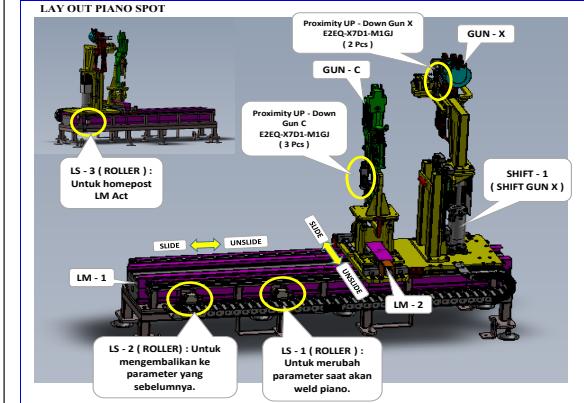


## CARA KERJA



ENGINEER	SH	LH	GH	PREPARED
SUNU AJI	SURADI	SUTRIMO	DIDI A.	FARID

CONSTRUCTION



CARA KERIA

# Next Action



## Yokoten Activity



**TMMIN** TOYOTA MOTOR MFG. INDONESIA  
KARAWANG PLANT #1  
PRESS WELDING PROD. DIVISION

**SCHEDULE YOKOTEN ACTIVITY**

No	KAIZEN	PIC	ACTIVITY	2022		2023						EVA
				NOV	DES	JAN	FEB	MAR	APR	MEI	JUN	
1	AUTO SPOT SOB FORTUNER RH	NURGIANTO (PWPD) SUNU AJI (PE)										
2	AUTO SPOT SOB ZENIX RH LH	NURGIANTO (PWPD) SUNU AJI (PE)										
3	AUTO SPOT SOB FORTUNER LH	PARNO (PWPD) SUNU AJI (PE)										
4	AUTO SPOT MRA PANORAMIC ZENIX	REZA PUTRA (PE)										
5	AUTO SPOT MRA FORTUNER	REZA PUTRA (PE)										
6	AUTO SPOT UFI UNDER BODY	REZA PUTRA (PE)										



DELAY MATERIAL

# Management Comment & Member Testimoni



## Management Genba



BOD & Management  
(Genba Check Improvement)



Team Member Testimoni

### Management Comment :

Terimakasih atas improve,  
sudah membantu tempat kerja  
nyaman, serta membantu  
menghilangkan ergonomic yang  
buruk, tolong feedback untuk  
next project.



**Mr. Rinaldi**  
Deputy Division Head PWPD

Terimakasih untuk  
improvementnya, dengan  
Automation di proses SOB.  
Sehingga proses kerja di welding  
menjadi aman dan nyaman.



**Mr. Supriyanto**  
Dept. Head Welding Body



THANK YOU  
ありがとう