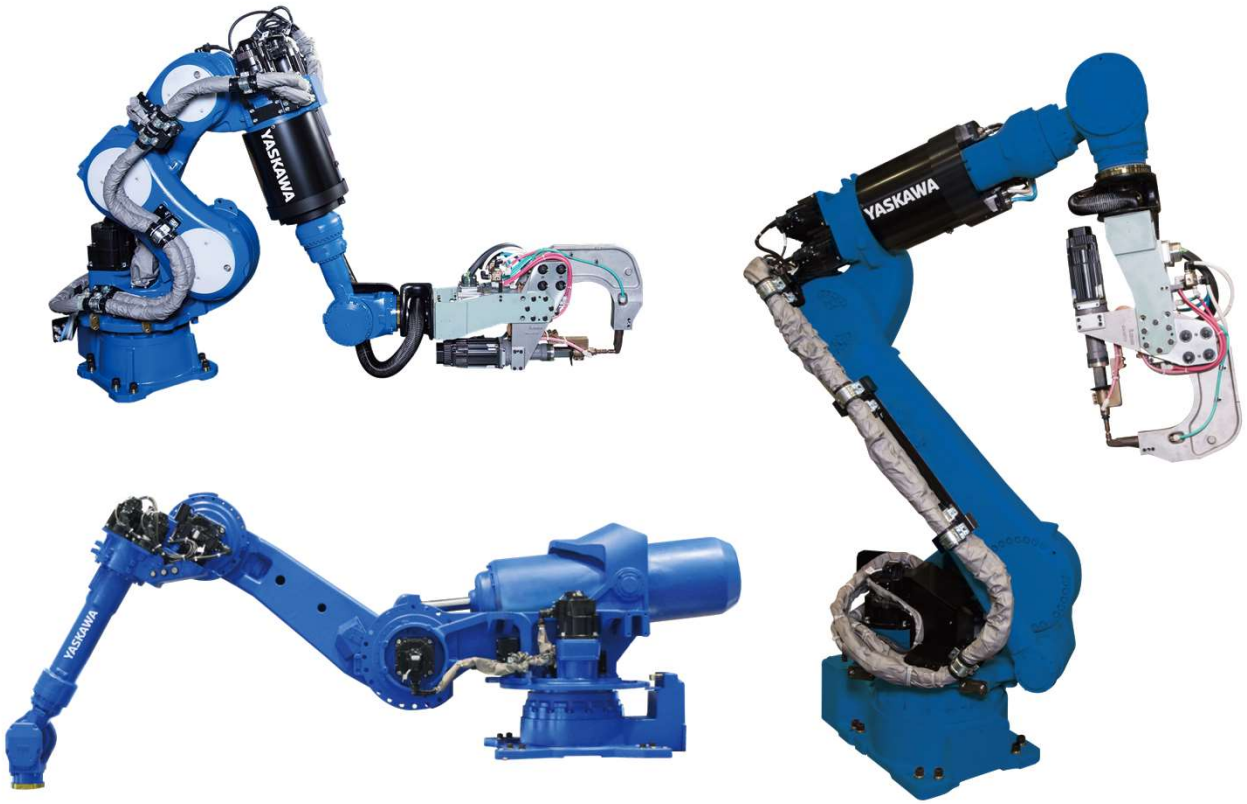
YASKAWA

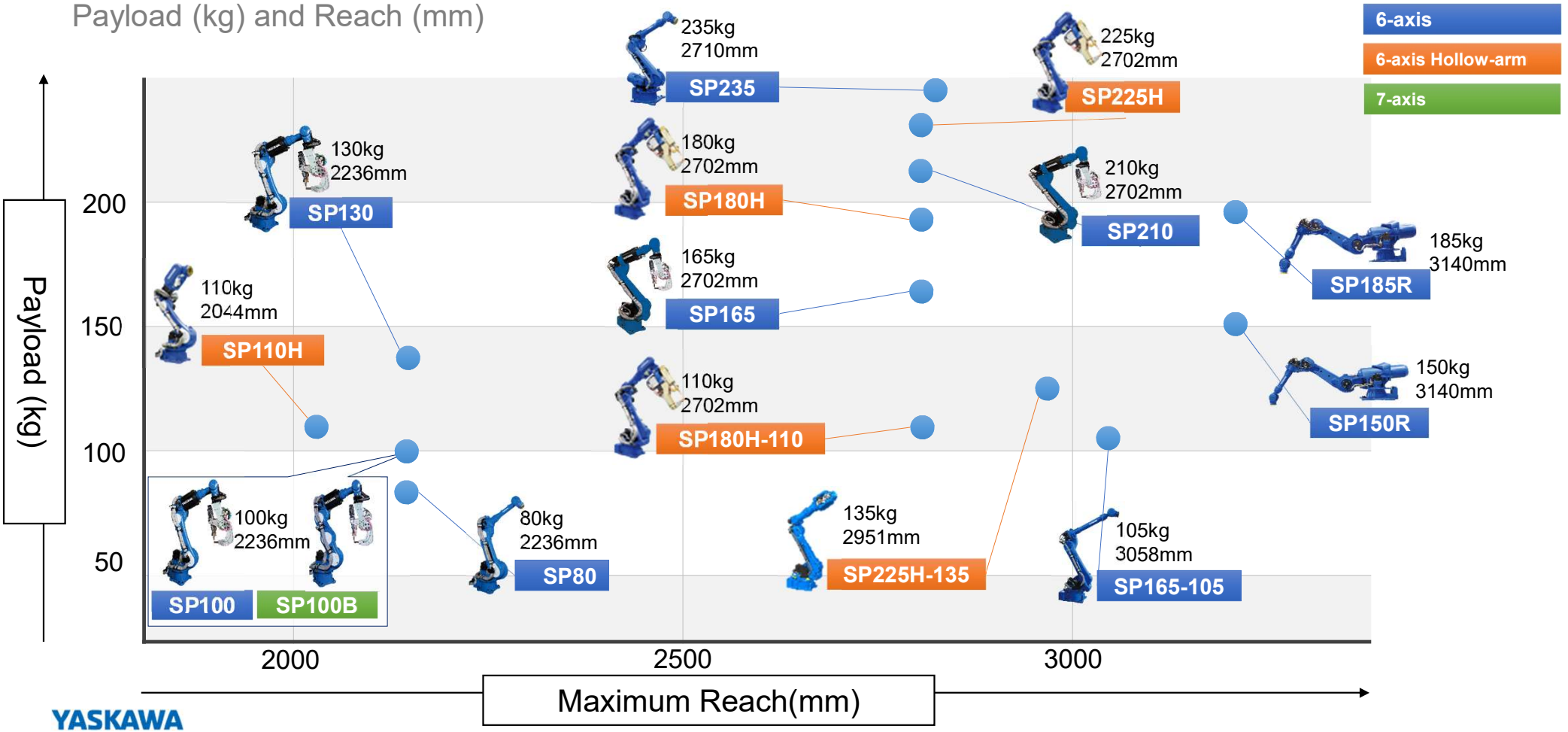
SP Series



YRC1000 Spot Welding Robots

SP-Series Lineup

Payload (kg) and Reach (mm)

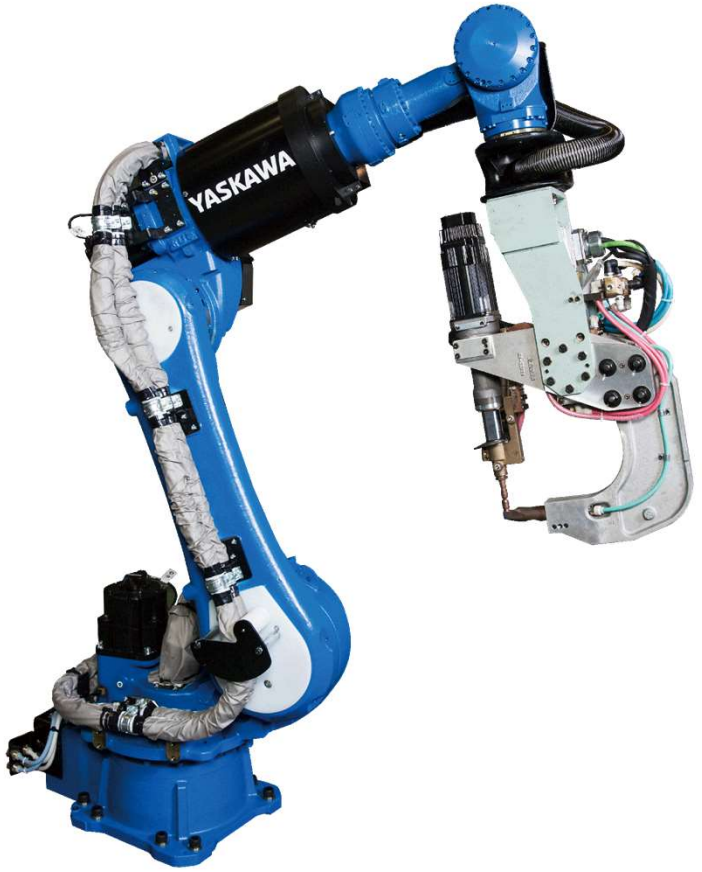


YASKAWA

SP Series

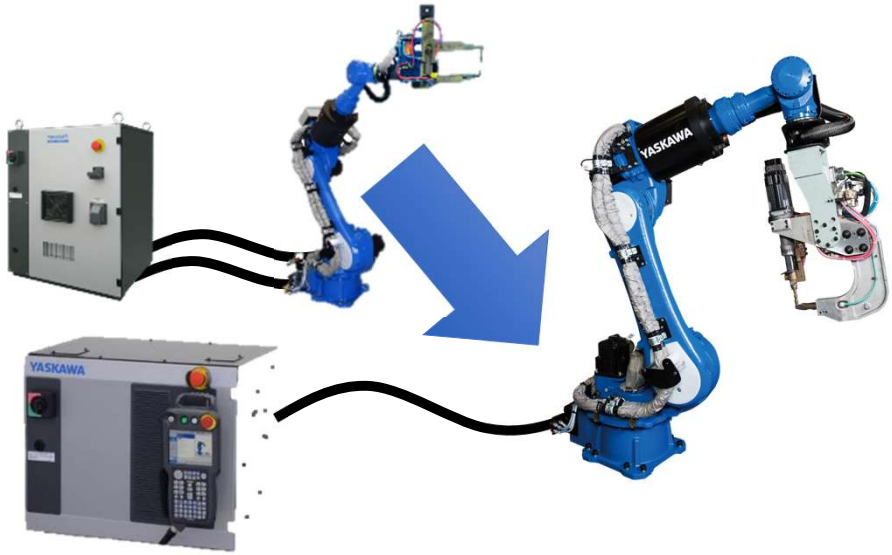
Wide variety available for a wide application mix

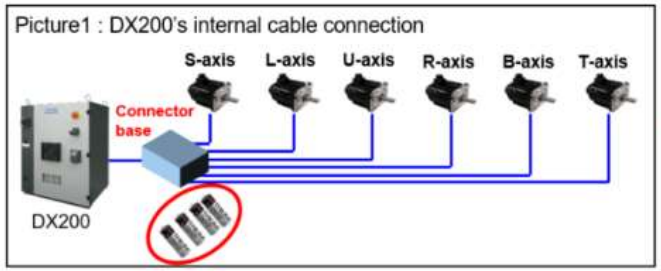
- **9 models for a wide variety** of payloads, reaches, and servo spot guns
- **Coordinated motion** between other Yaskawa robot models and positioners
- **Exclusive integrated spot harness** improves wrist flexibility and reduces downtime
- **Servo-controlled spot guns** with efficient Direct Current (DC) spot timers are synchronized to provide improved quality at reduced cycle time
- **Programming of Medweld and Nadex timers** with commands from robot pendant
- **Service and warranty** coverage from a single source - Yaskawa

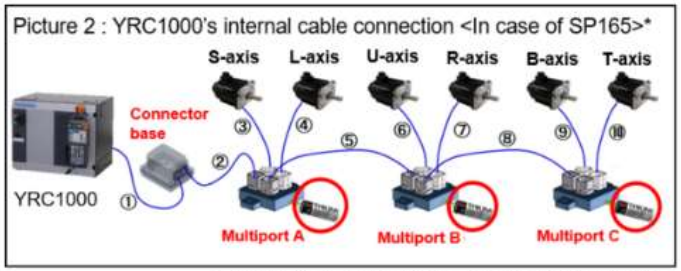


YRC1000 Improvements

- Single controller cable decreases setup time and reduces cable trip hazards
- Improved wiring harness improves maintenance and trouble shooting
  - Error messages can pinpoint axis faults
  - No battery in new Sigma 7 motor encoders
    - Includes Spot guns using Yaskawa Sigma 7 motors





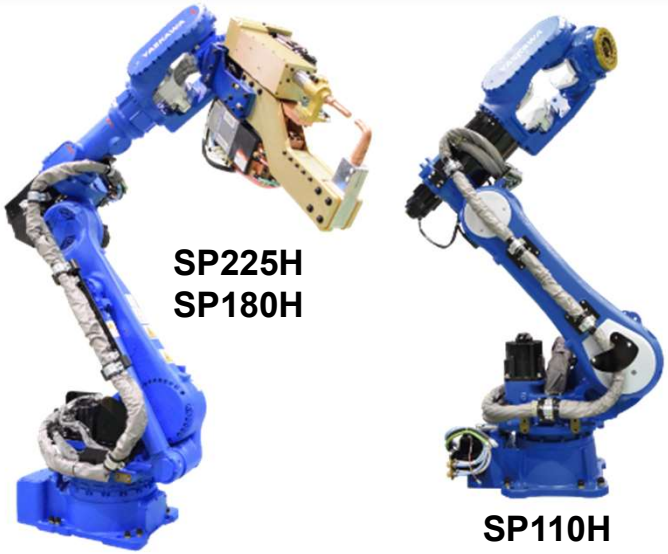


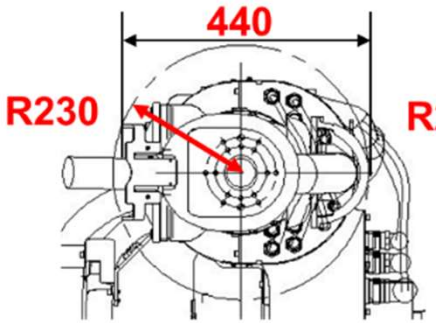
* The location of the multiport may vary by model

SP Hollow Arms

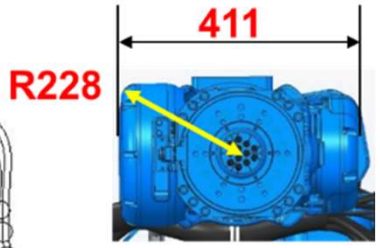
Internal Cable Harness

- Reduces external cabling by adding through-arm routing
- Ideal for Aluminum spot guns that require larger gauge harness
- Yaskawa aluminum welding spot harness included
- Reduced wrist interference

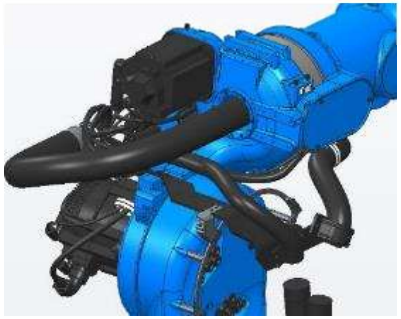




SP210

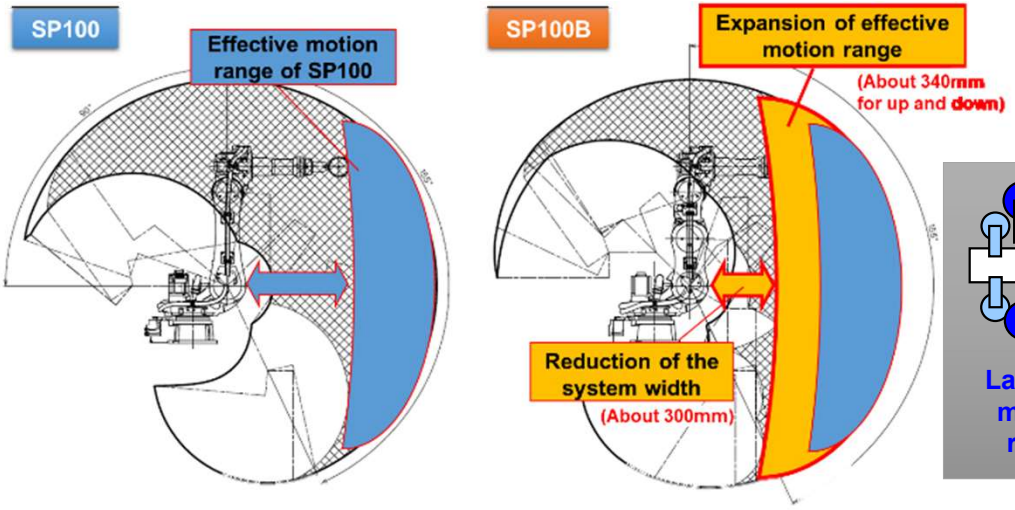


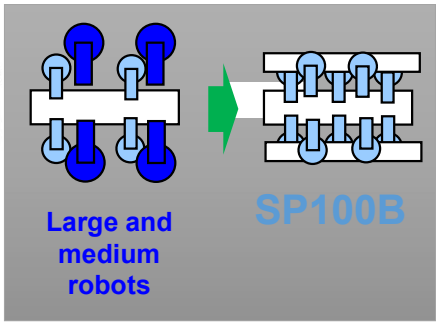
SP225H

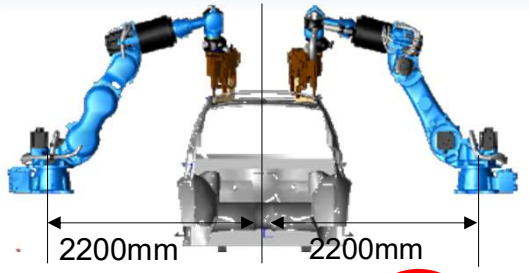


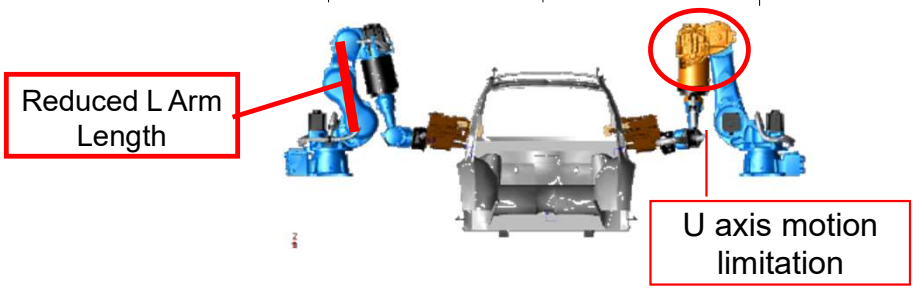
SP100B – 7 Axis Robot

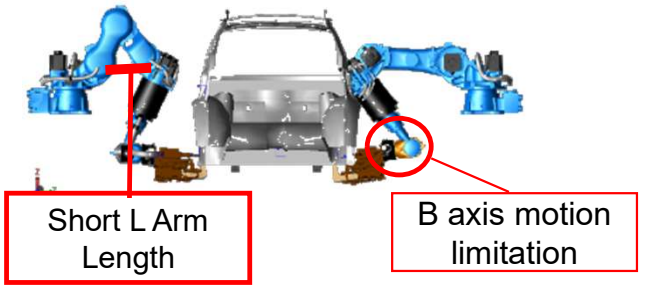
- L-Arm length can be changed by bending E-Axis (extra axis)
- Expands the available spot welding range
- Can access inside of tight spaces with flexible range
- Can weld entire automotive body from top to under side
- High-density system layout with smaller footprint











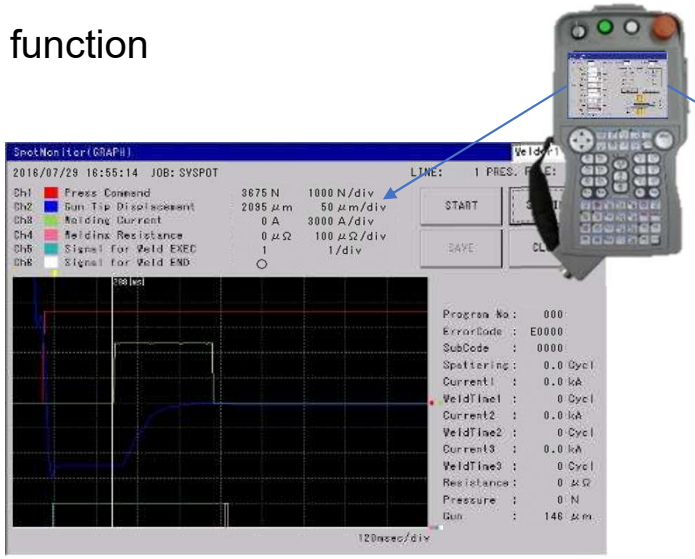
Dedicated Spot Welding Pendant Functions

- YRC1000 calculates welding conditions by entering plate condition
- Wave form visualization of weld timer and results
  - Check welding conditions when setting up a production line
  - Check welding status when a defect is detected
  - Check wave forms when correcting welding conditions
- Automatic workpiece search function

Robot data
- Gun pressure instruction
- Gun axis movement amount

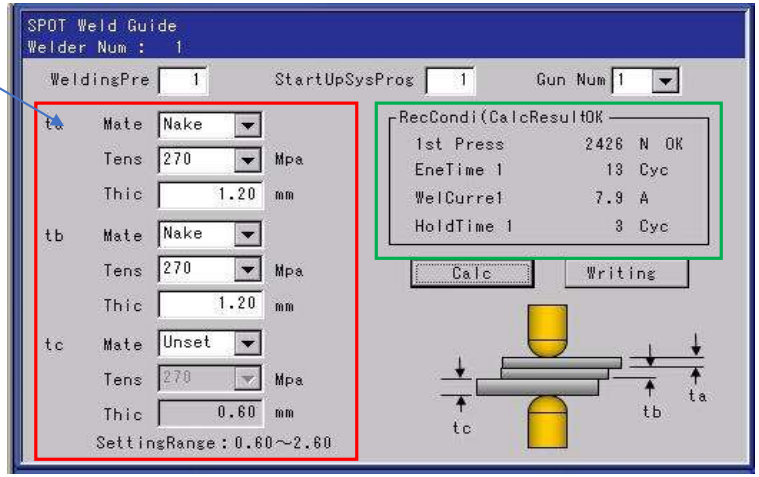
Welding timer
- Welding current
- Welding resistance

IO signal
- Signal for welding starting conditions
- Signal for welding completion



User Sets:
- Material
- Tension
- Plate thickness
- Number of plate

Recommended welding conditions
- Gun pressure
- Resistance welding time
- Welding current
- Hold time



YRC1000 SPOT FUNCTIONS

SPOT MONITORING AND GRAPHING FUNCTION

Spot monitoring and graphing function

*A welding timer from NADEX CO., LTD. must be used to confirm this function. Contact your Yaskawa representative for details on welding timers.

Welding quality can be visualized because robot data and welding results from the welding timer can be displayed on the programming pendant in a wave form.

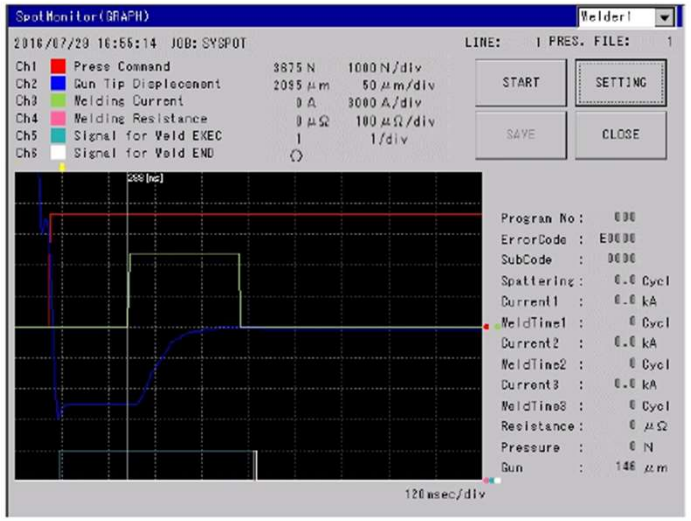
When to use
- Checking welding conditions when setting up a production line
- Checking welding status when a defect is detected
- Checking wave forms when correcting welding conditions

Display items

Robot data
- Gun pressure instruction
- Gun axis movement amount

Welding timer
- Welding current
- Welding resistance

IO signal
- Signal for welding starting conditions
- Signal for welding completion



SPOT WELD CONDITION WELD GUIDE

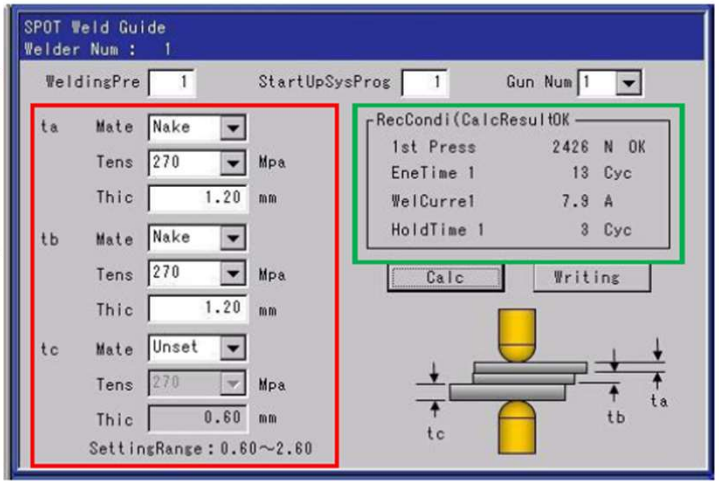
Spot welding conditions guiding function

*A welding timer from NADEX CO., LTD. must be used to confirm this function. Contact your Yaskawa representative for details on welding timers.

The YRC1000 allows the automatic calculation of recommended welding conditions just by entering the plate condition. This allows conditions for the pressure file and welding timer to be easily set. Calculation results can be saved to the robot and timer with a click of a button.

Material: Bare material / Plated material, **Tension**: 270/340/440/590/780/980/1180 (7 kinds)
Plate thickness: 0.65 to 2.60mm, **Number of plates**: 2 or 3 plates

Setting items
- Material
- Tension
- Plate thickness
- Number of plate



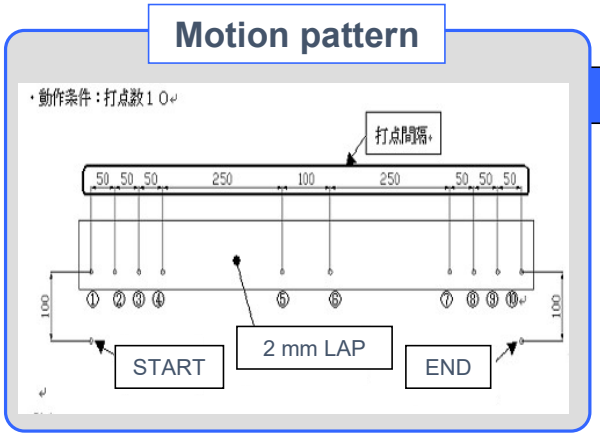
Recommended welding conditions
- Gun pressure
- Resistance welding time
- Welding current
- Hold time

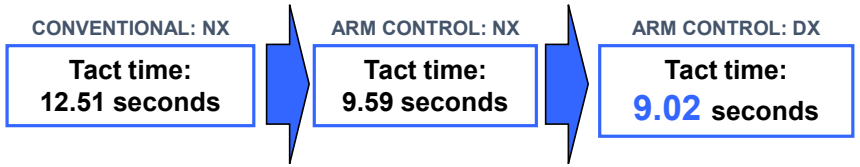
REDUCED CYCLE TIME WITH OPTIMIZED CONTROL

REDUCE SPOT WELDING TIME

- ARM* control function optimizes the motion of motor gun and reduces tact time
- Reduce tact time further by high-speed CPU and optimized pressure control
- High speed gun function

* Advanced Robot Motion (Our robot optimization control function offers vibration suppression control and optimum acceleration/deceleration control)





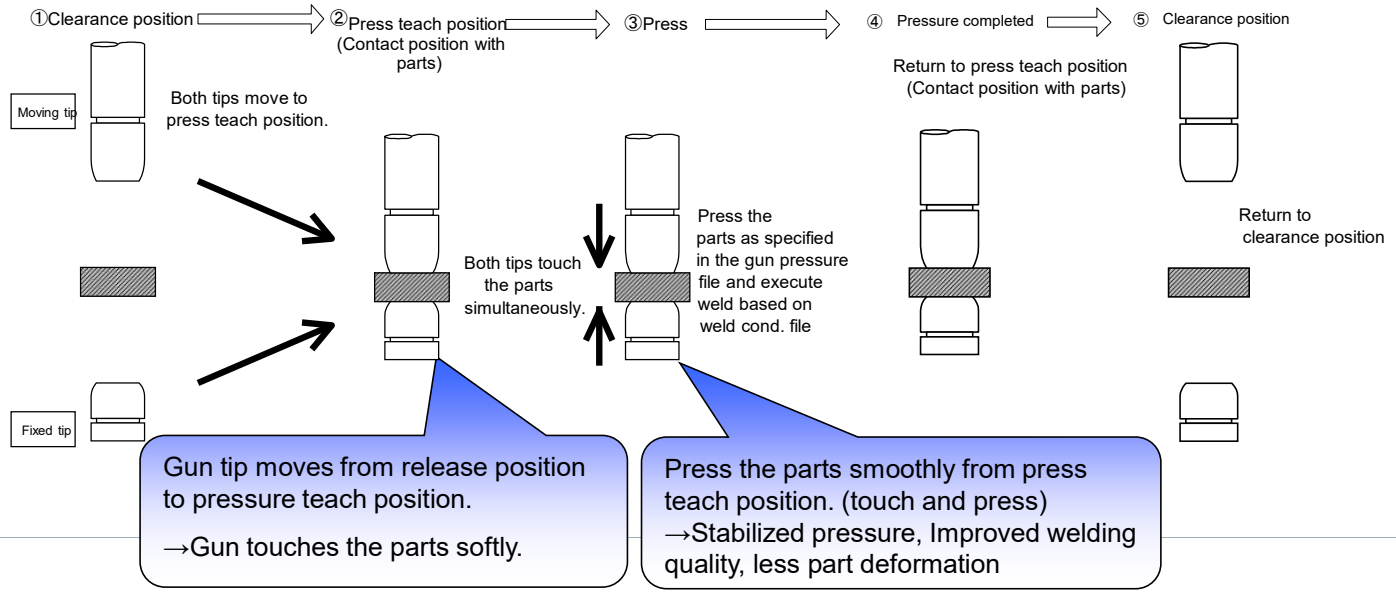
Reduce tact time 3.5 seconds per 10 welding points! (0.35 second per 1 welding point)

*Reduced time is different from gun capability

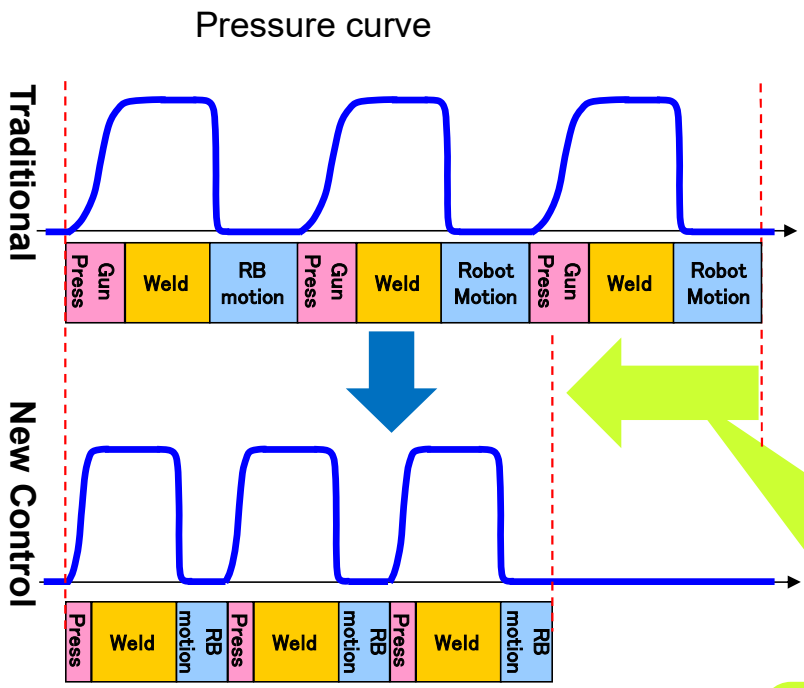
Improve welding accuracy quality by high speed electric gun and smooth trajectory !

FEATURES OF SVSPOTMOV INSTRUCTION

- Gun can touch the parts softly when executing the weld.
  - Allows pressure stabilization (pressure accuracy improvement, overshoot control) and welding quality improvement (reduced spatter) and reduced part deformation.
- Only need to teach one point for SVSPOTMOV (SVSPOTMOV includes MOV + MOV + SVSPOT + MOV)
  - Reduced teaching points: simplified JOB.
- Motions other than the actual press instruction is based on normal robot speed (up to V=1600mm/s)
  - Improved cycle time

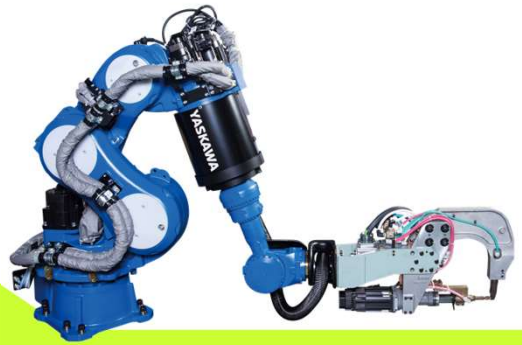


HIGH SPEED SPOT WELDING



Control curve when utilizing new spot control

- High speed robot motion
  - By utilizing the new vibration control, robot can move faster
- High speed gun axis motion
  - Minimize time required to achieve gun pressure, etc.



Cycle time reduced up to 30%

**Reduced time will vary based on gun characteristics and motion pattern.

AUTOMATIC PRESSURE COMPENSATION

- Changing the gun orientation will affect the applied pressure.

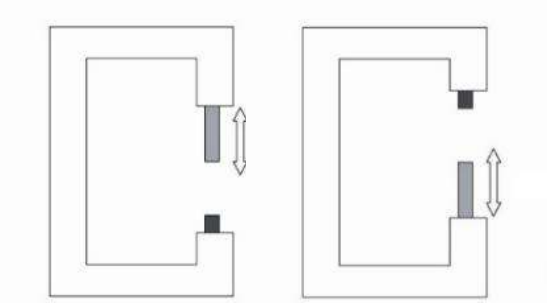


Fig. 1 Pattern 1 (Applying Pressure Downw

Fig. 2 Pattern 2 (Applying Pressure Upwards)

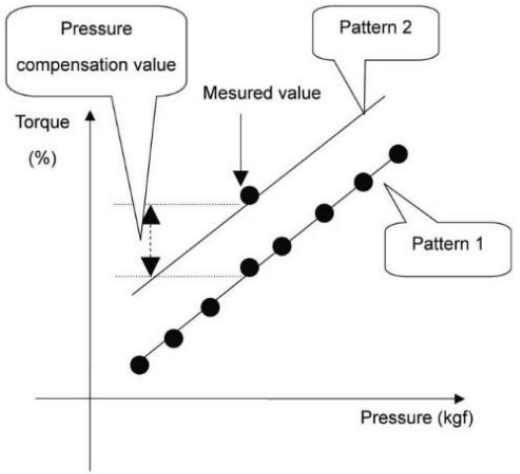
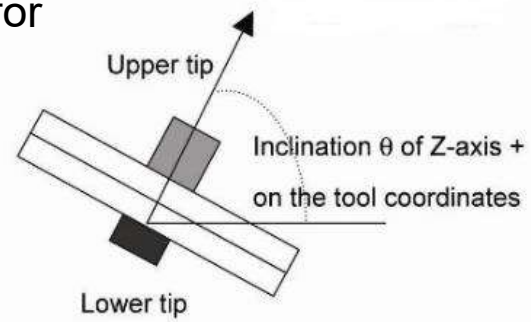
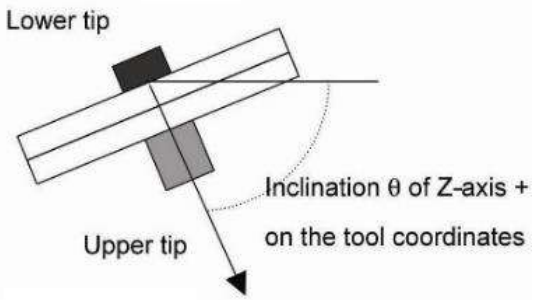


Fig. 5 Pressure Compensation (For Pattern 2)

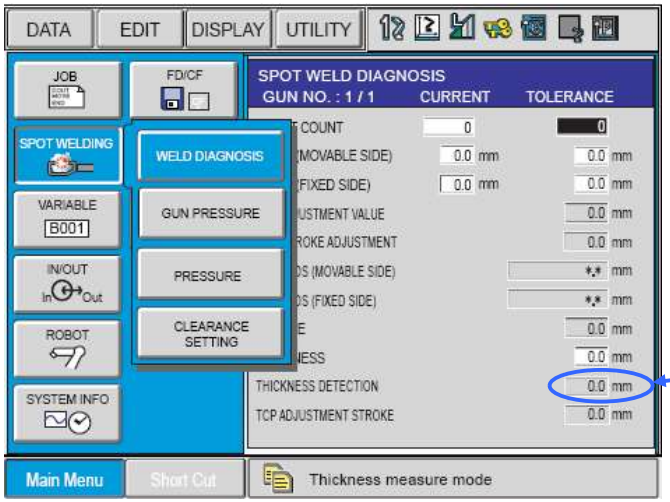
- The pressure compensation value will adjust the torque for different gun orientations to maintain a stable gun pressure.

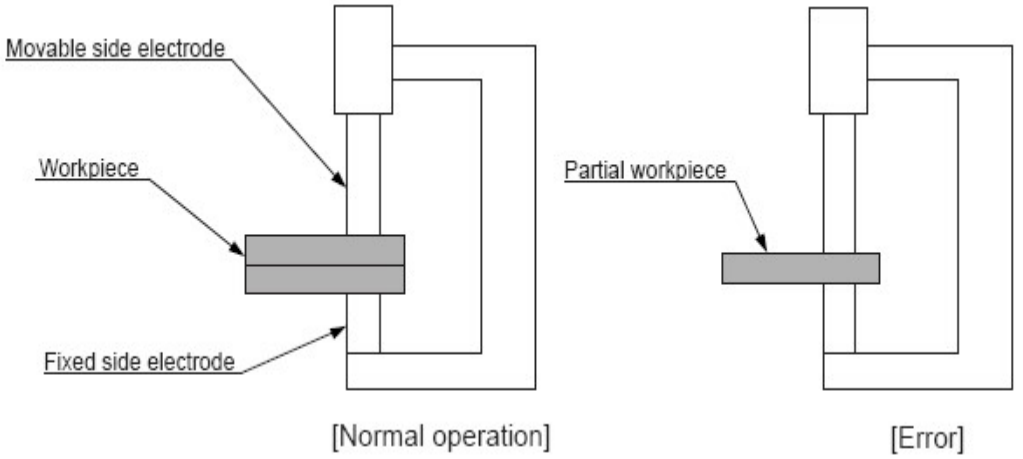




THICKNESS DETECTION

- Monitors the thickness of workpiece to be welded at the SVSPOT instruction.
- Allowable thickness can be set in either distance (mm) or ratio (%).

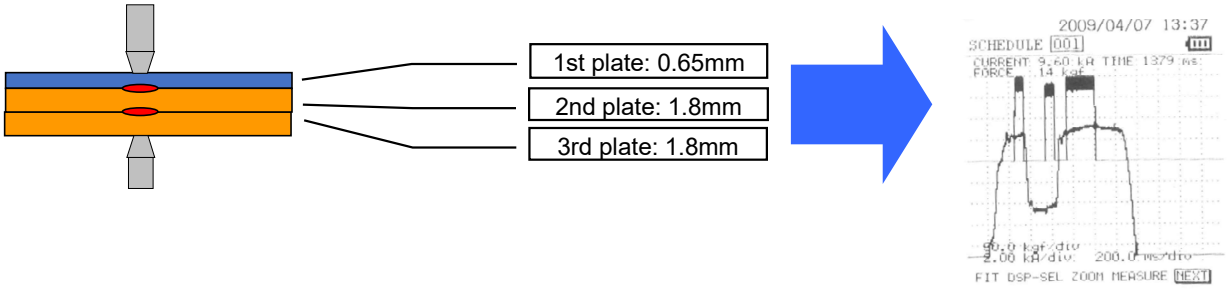




- Detected thickness is displayed in spot weld diagnosis screen.

MULTIPLE STEP PRESSURE

- Multiple SVSPOT instructions are executed within one command.



NX100

SVSPOTMOV CLF#(1) GUN#(1) PRESS#(1) WTM=10
WST=1

Pressure Setting File#(1)
Touch speed: 5%
Touch press: 200kgf
1st press: 250kgf Press time 0.18 sec
2nd press: 80kgf Press time 0.20 sec
3rd press: 250kgf END WAIT

Weld Schedule#(10)
SQUEEZE 0 CYCLES
PREHEAT 05 CY. 07500 AMPS
COOL 12 CYCLES
PREHEAT 05 CY. 07000 AMPS
COOL 07 CYCLES
WELD 16 CY. 07500 AMPS
HOLD 05 CYCLES

Need to look at torque-current curve to sync the weld pressure and current

Multi-step pressure function

SVSPOTMOV CLF#(1) GUN#(1) PRESS#(1) WTM=1 WTM2=2 WTM3=3 WST=1

Pressure Setting File#(1)
Touch speed: 5%
Touch press: 200kgf
1st press: 250kgf END WAIT
2nd press: 80kgf END WAIT
3rd press: 250kgf END WAIT

Each pressure stage is executed with a different SVSPOT instruction, so the weld pressure and current is always synchronized.

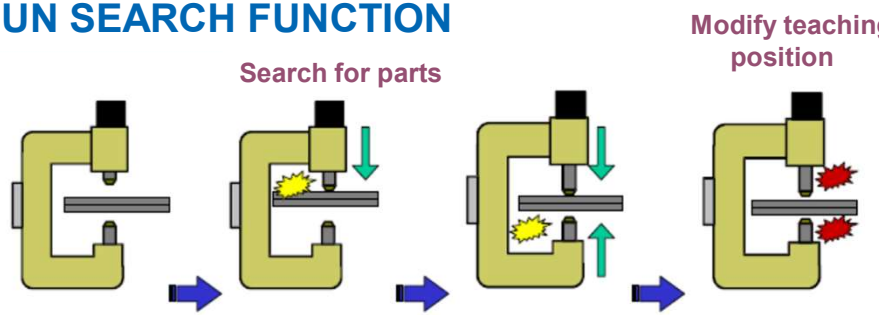
Weld Schedule#(1)	Weld Schedule#(2)	Weld Schedule#(3)
SQUEEZE 0 CYCLES PREHEAT 05 CY. 07500 AMPS	SQUEEZE 0 CYCLES PREHEAT 05 CY. 07000 AMPS	SQUEEZE 0 CYCLES WELD 16 CY. 07500 AMPS HOLD 05 CYCLES

WORKPIECE SEARCH FUNCTION

Automatically modify the weld teaching position

- For welds using SVSPOTMOV commands, robot will automatically search the parts, then automatically modify the position in the direction of the gun motion.
- This can be done in teach mode and play mode.
- Can modify up to 50 weld points.
- No need to set the thickness of the parts.

GUN SEARCH FUNCTION



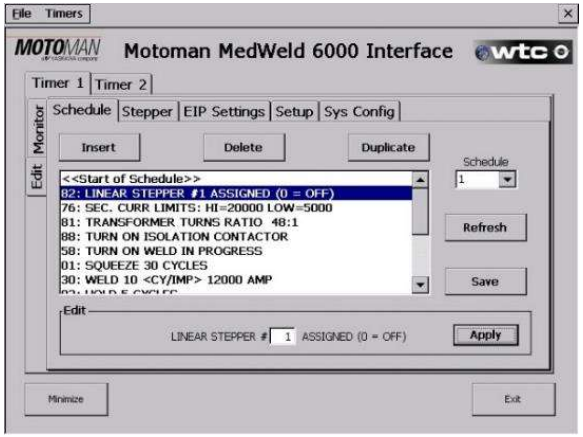
When parts are shifted, re-teaching can be done automatically

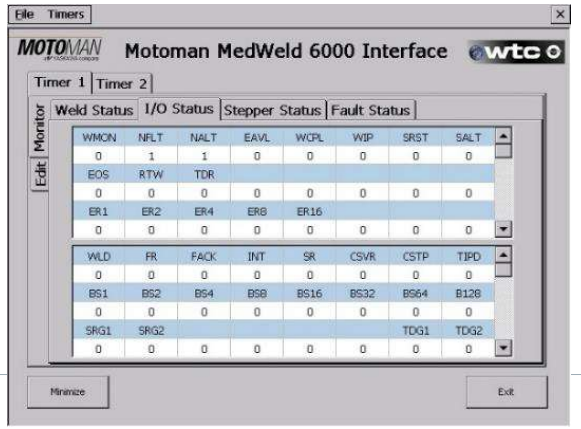
Significantly reduce teaching time!

Able to update the measurement result simultaneously

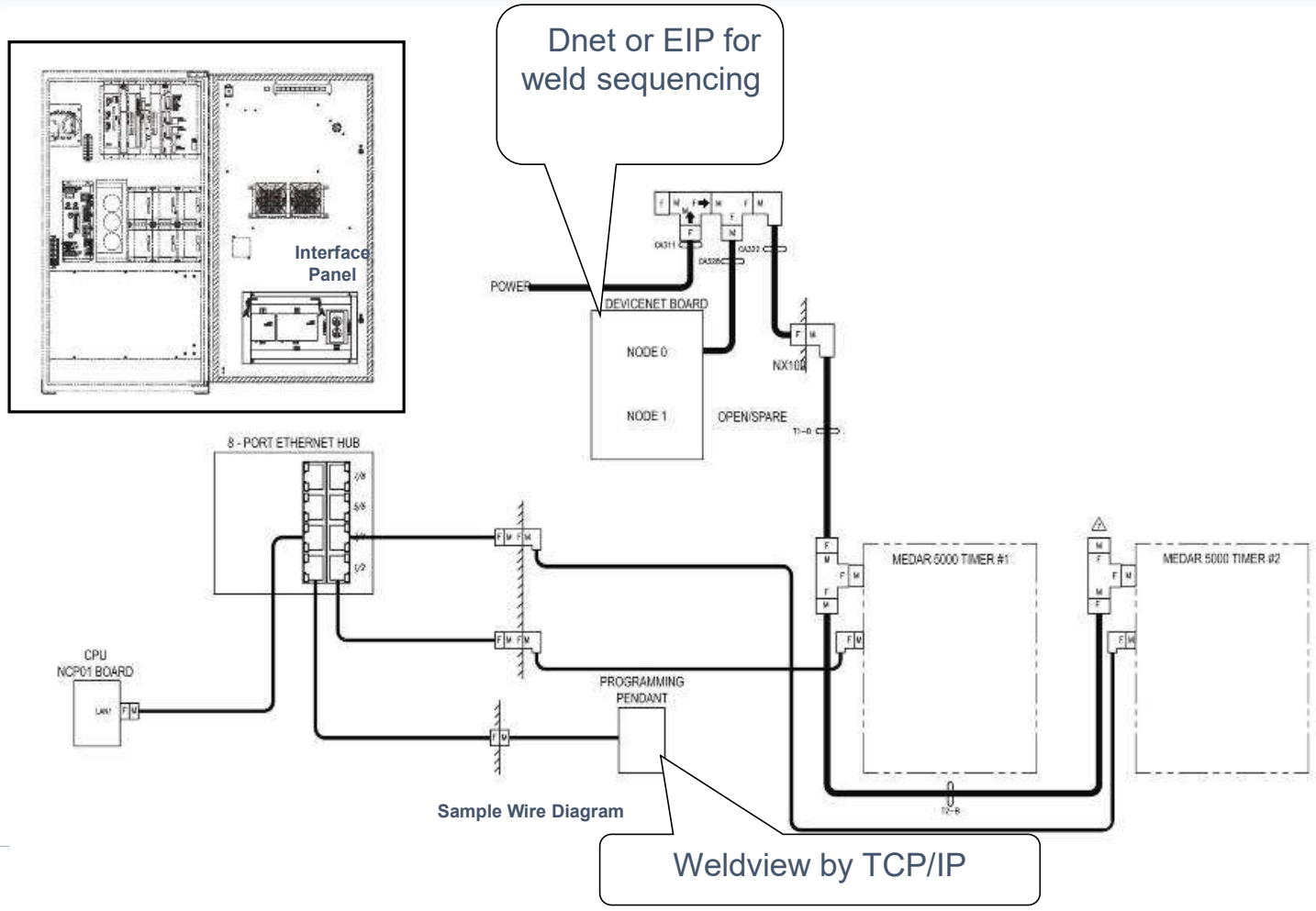
Modification result display screen

MOTOMAN WTC 6000 SPOT TIME INTERFACE





DIGITAL COMMUNICATION WITH MEDWELD 6000

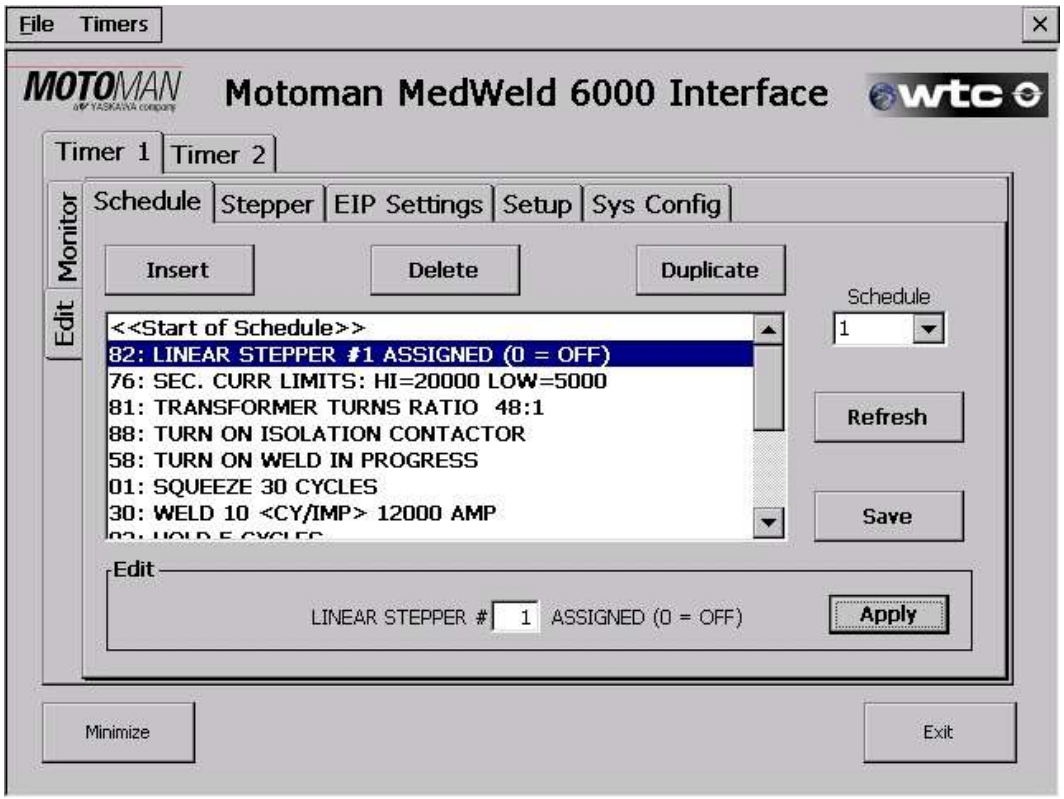


Sample Wire Diagram

NETWORKING WITH WTC 6000 TIMERS

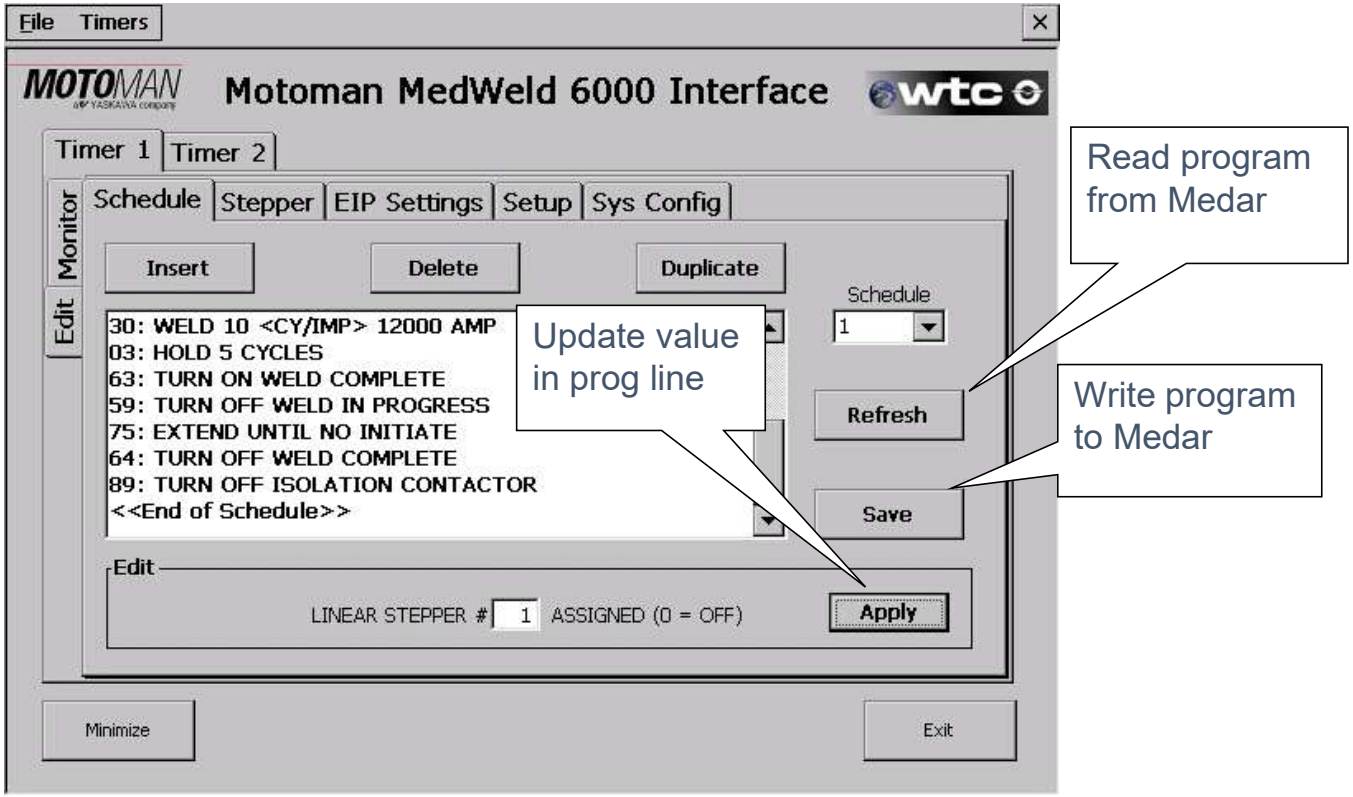
- WTC 6000 timer utilizes two digital networks
- DeviceNet or Ethernet IP
- Up to four timers controlled from DX or YRC
- Sequence firing of timers
- Ethernet local port
- Programming commands by Weld Gateway
- Full function programming with Medar commands
- Stepper files and weld monitoring

WELD SCHEDULE PROGRAMMING

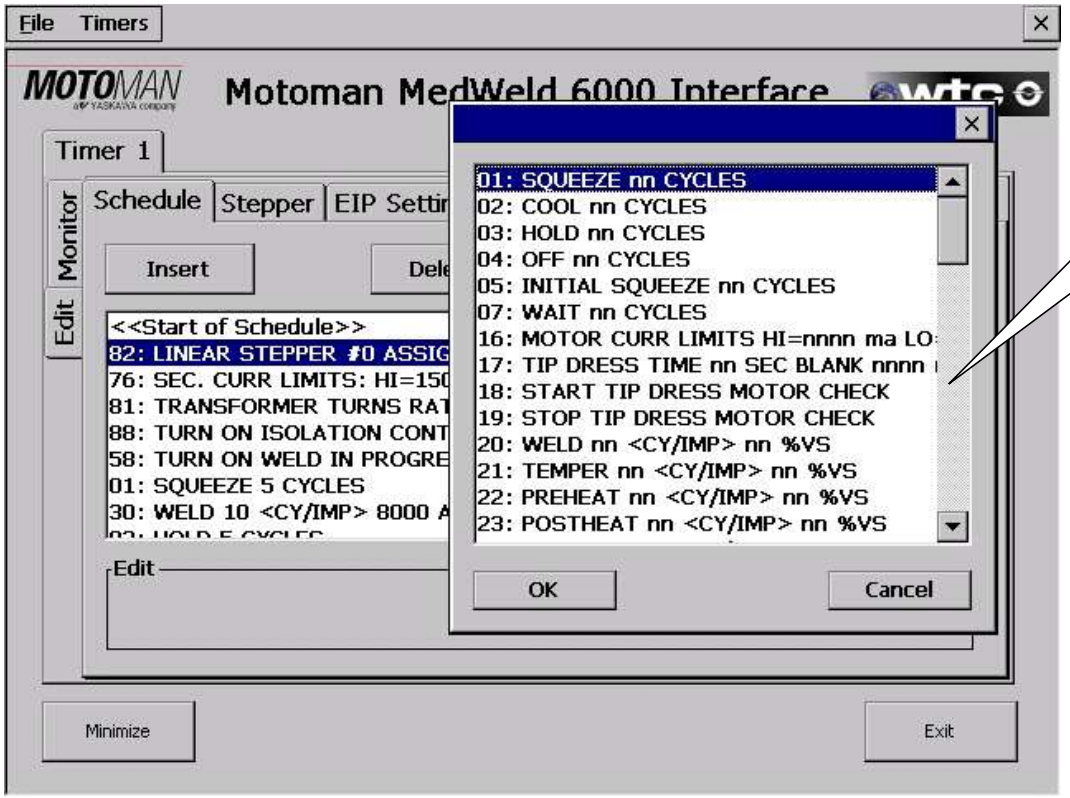


"Free Form" programming with any Medar supported commands

WELD SCHEDULE PROGRAMMING AND EDITING

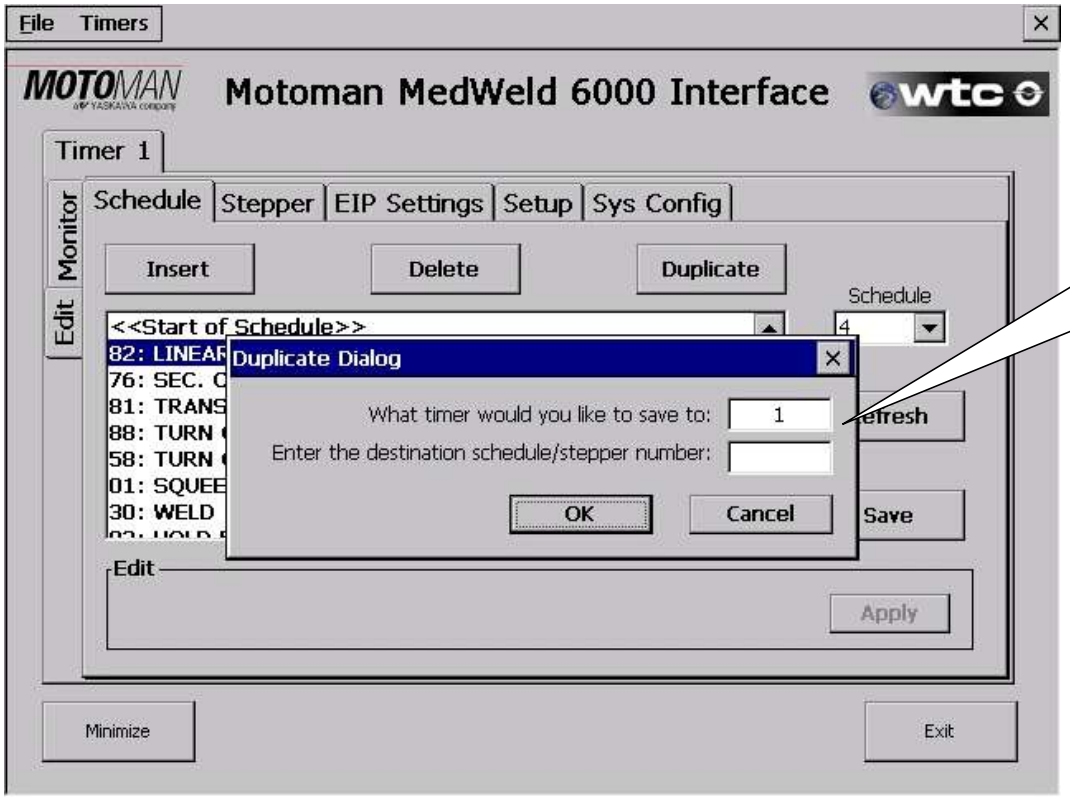


WELD SCHEDULE PROGRAMMING



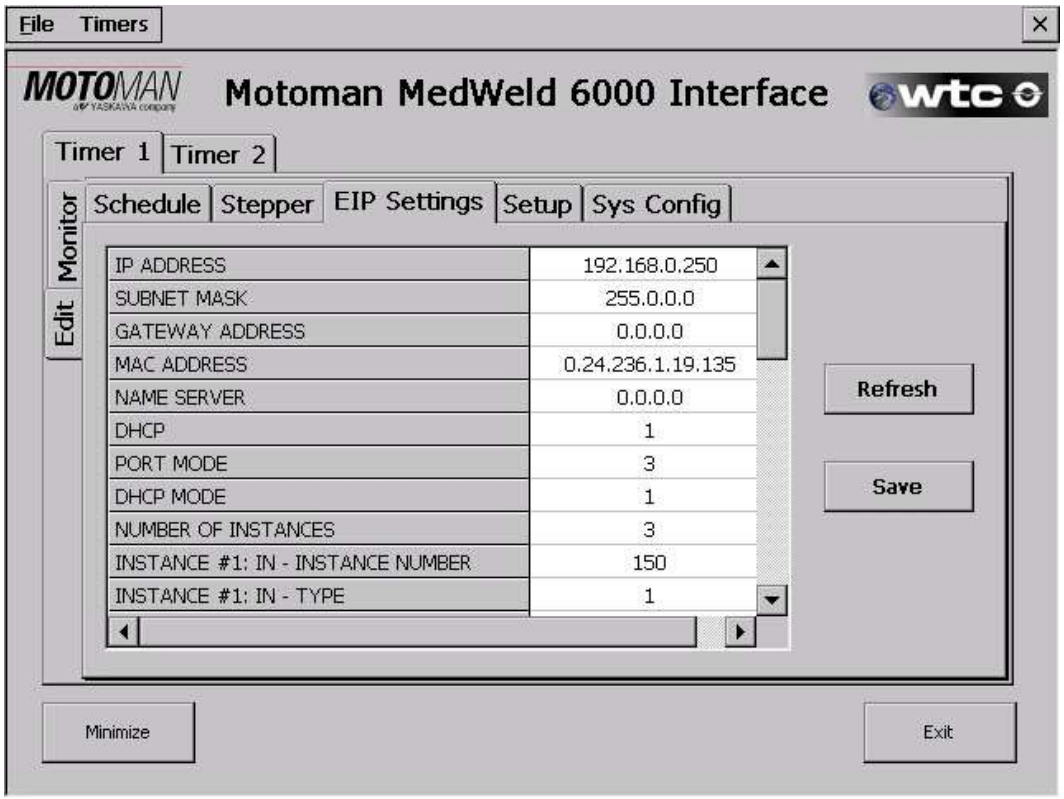
Insert any of the Medar Commands

WELD SCHEDULE PROGRAMMING

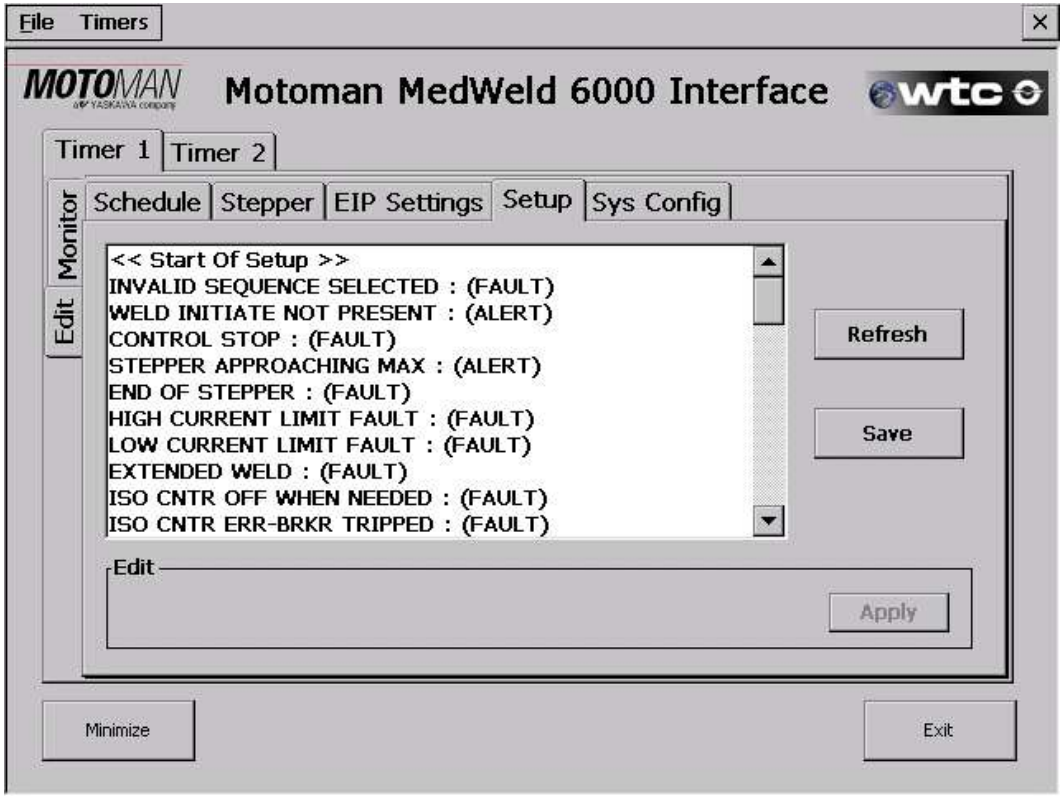


Utility to copy schedules

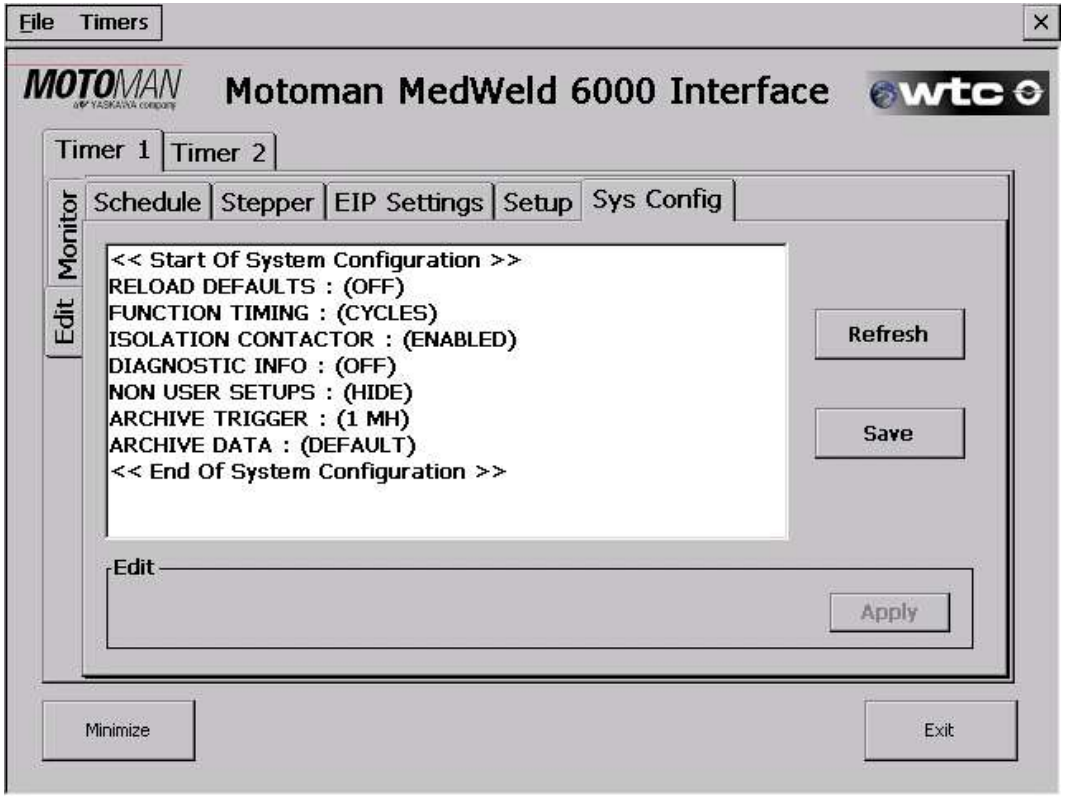
ETHERNET SETTINGS



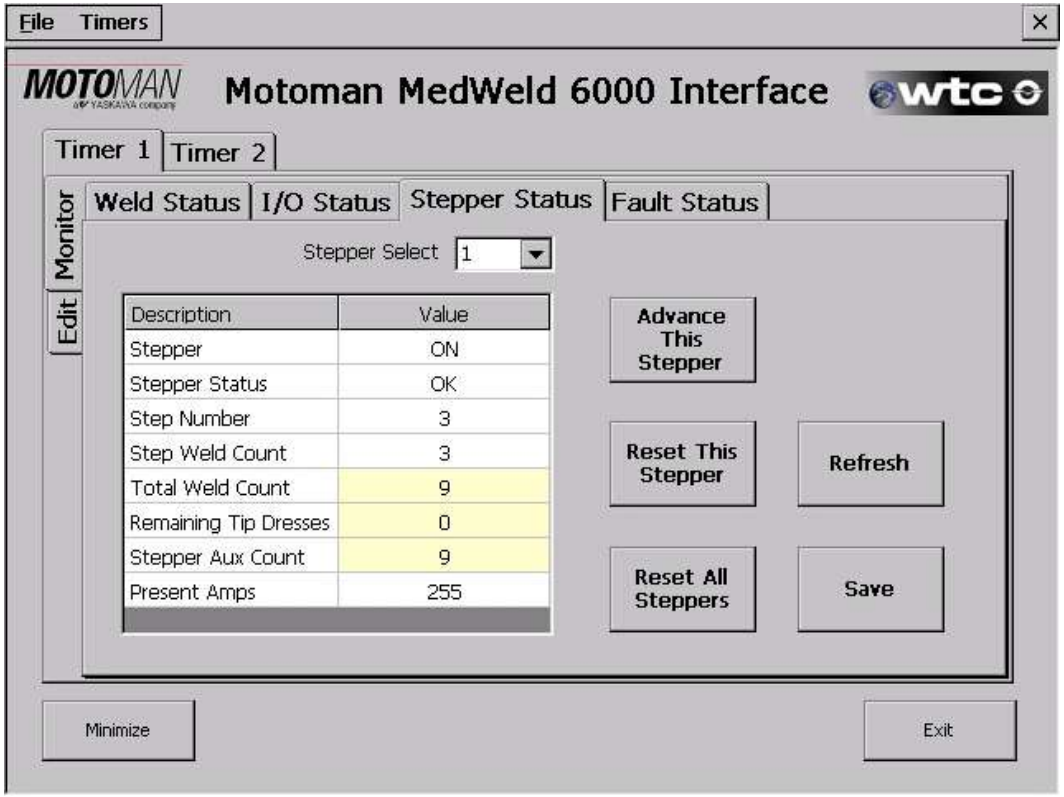
WELD SETUP EDITING



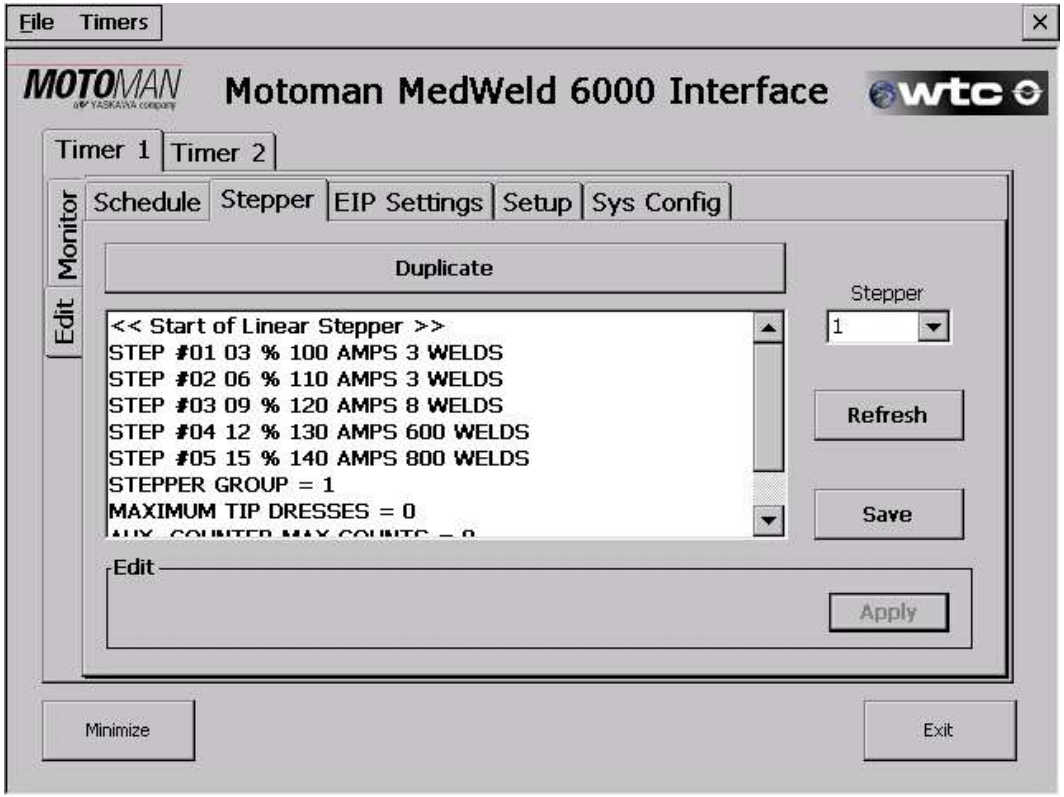
WELD SYSTEM CONFIGURATION



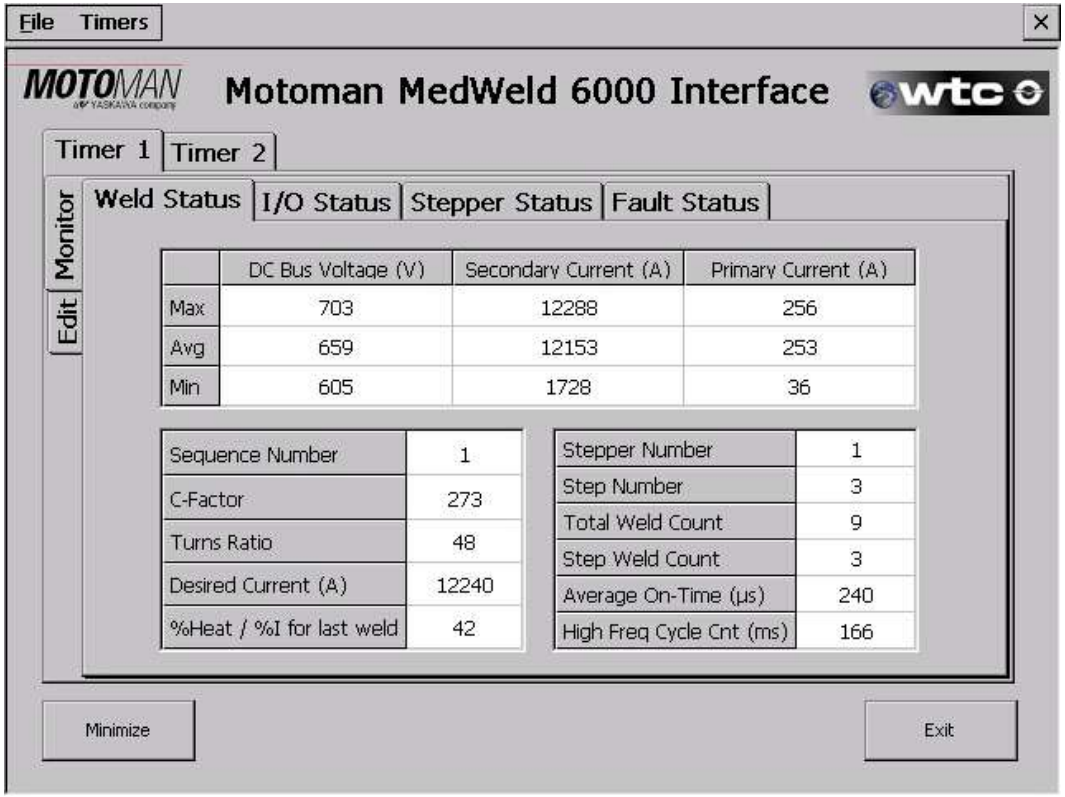
STEPPER MONITOR



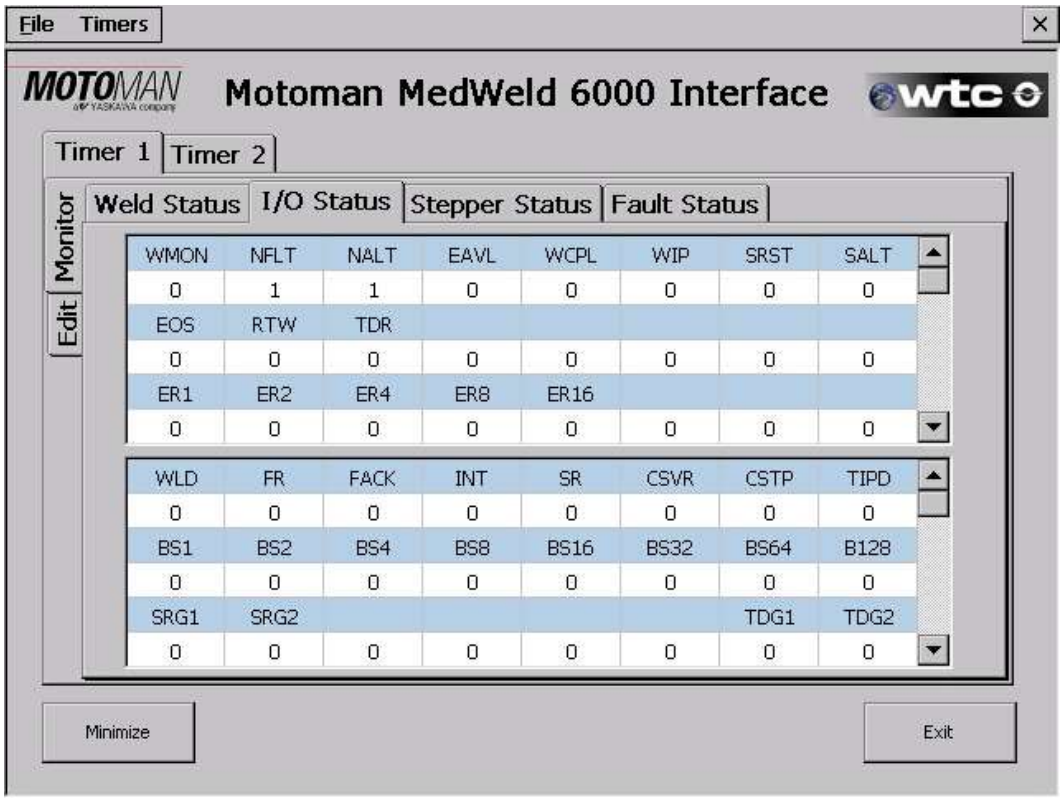
STEPPER PROGRAMMING



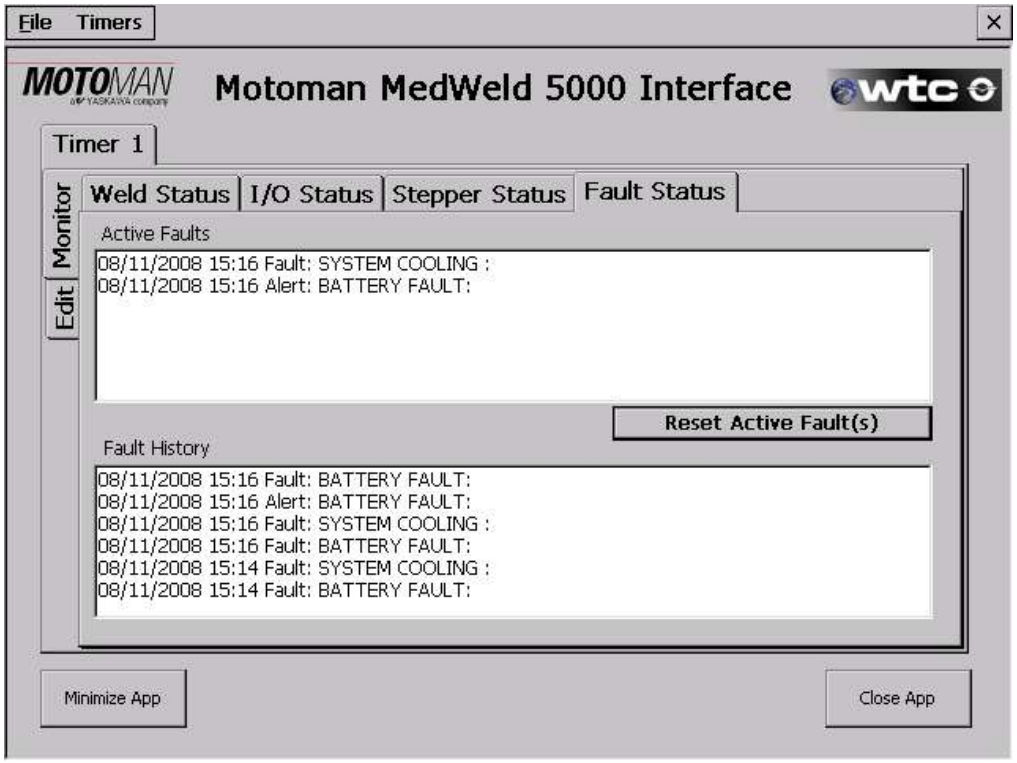
WELD STATUS MONITOR



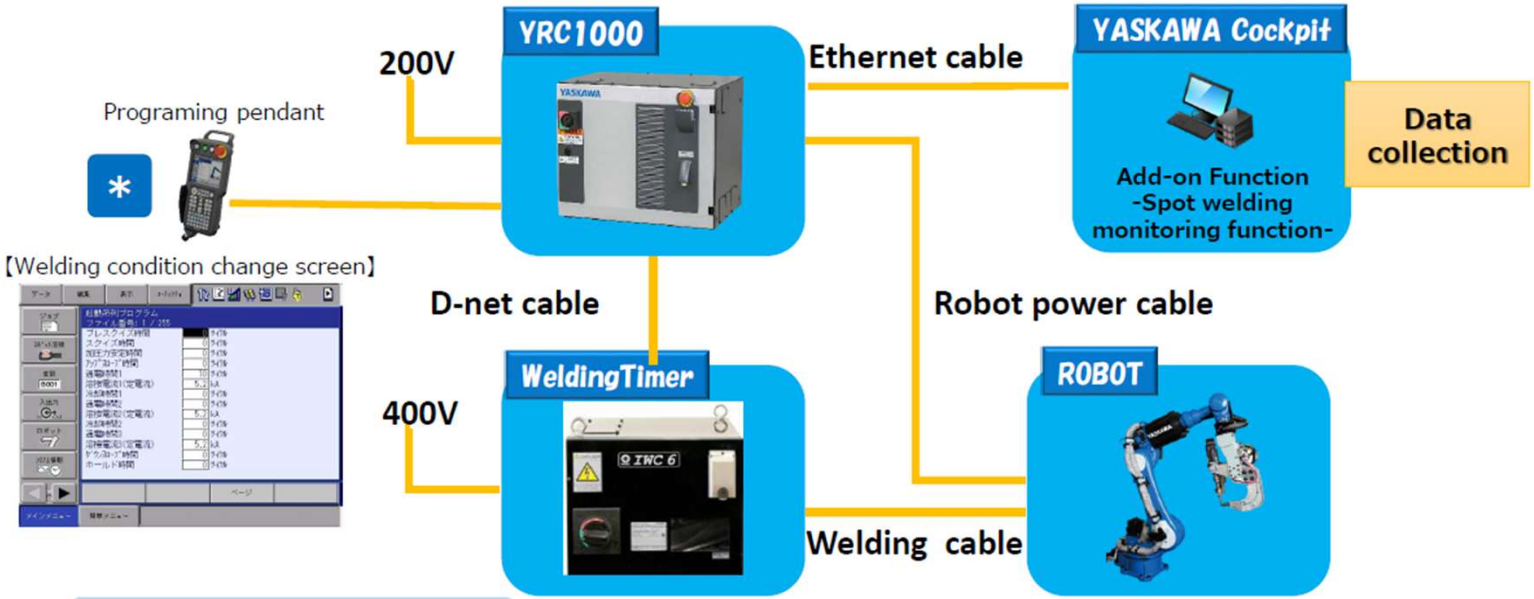
WELD STATUS MONITOR I/O



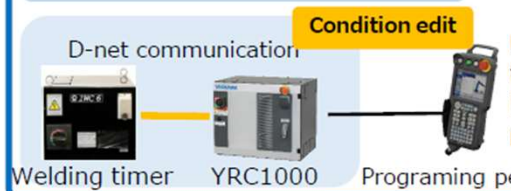
FAULT STATUS MONITOR



YASKAWA COCKPIT INTEGRATION

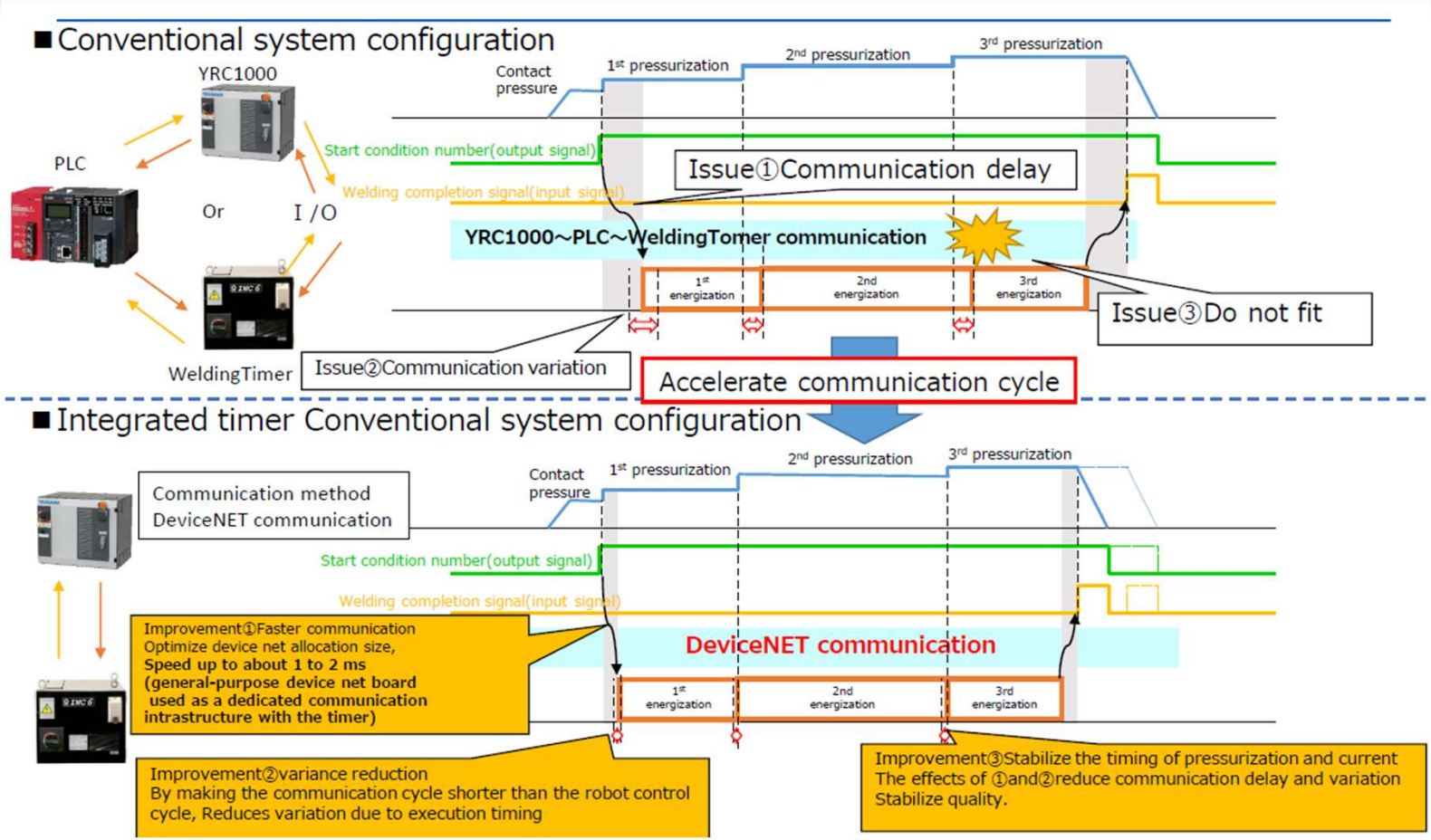


＊Integration timer function＊



Normally the welding conditions(welding current/welding time)within the timer that are individually managed
By connecting the welding timer to the robot controller with a D-net cable it is possible to edit with the programming pendant.

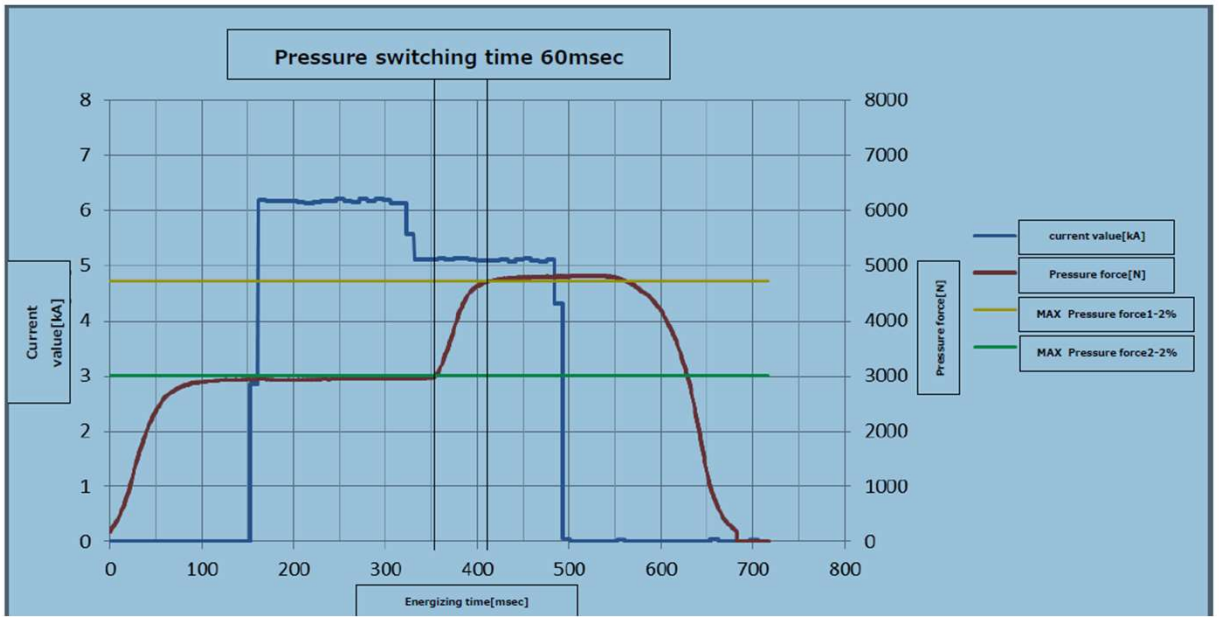
SMART SPOT TIME REDUCTION



PRESSURE AND POWER SYNC

It is possible to manage the welding quality data by adjusting the welding conditions while checking the waveform at each dot

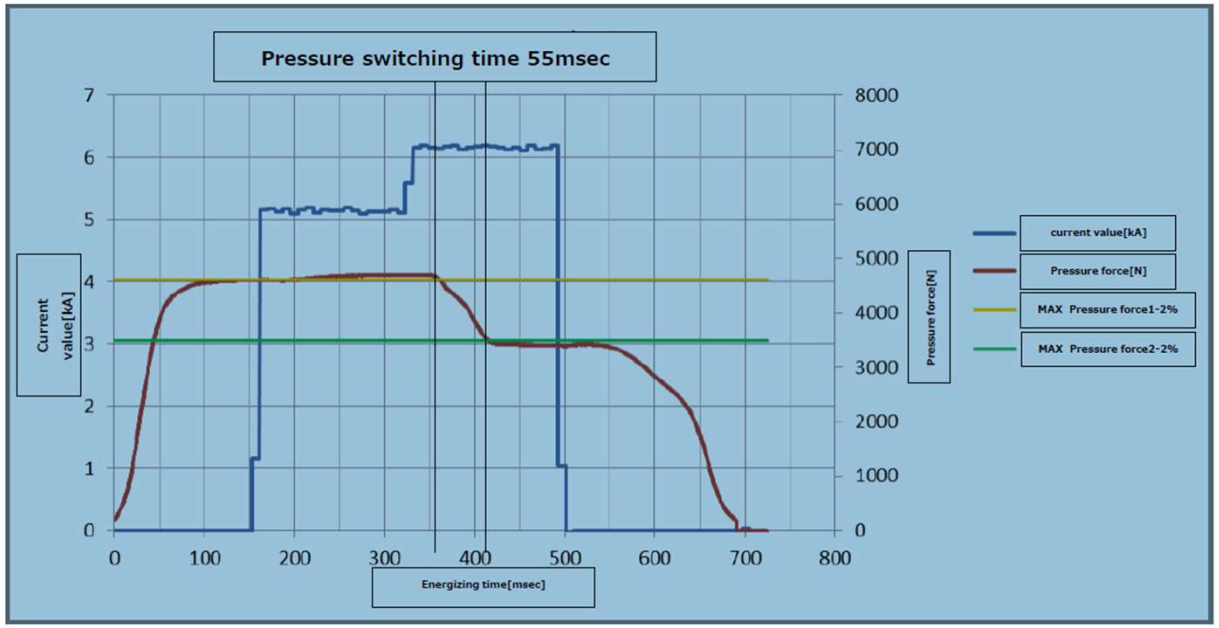
Condition1							
Set current value1[kA]	Energizing time1[cyc]	Cooling time1[cyc]	Pressure force1[N]	Set current value2[kA]	Energizing time2[cyc]	Cooling time2[cyc]	Pressure force2[N]
6	10	0	3000	5	10	0	4800



PRESSURE AND POWER SYNC OPTIMAZATON

It is possible to manage the welding quality data by adjusting the welding conditions while checking the waveform at each dot.

Condition2							
Set current value1[kA]	Energizing time[cyc]	Cooling time[cyc]	Pressure force1[N]	Set current value2[kA]	Energizing time2[cyc]	Cooling time2[cyc]	Pressure force2[N]
5	10	0	4700	6	10	0	3300



YASKAWA

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