

Kawasaki Robot Business For General Industry

March 15, 2017

Kawasaki Robotics (Tianjin) Co., Ltd.
TADASHI Isobe





Kawasaki

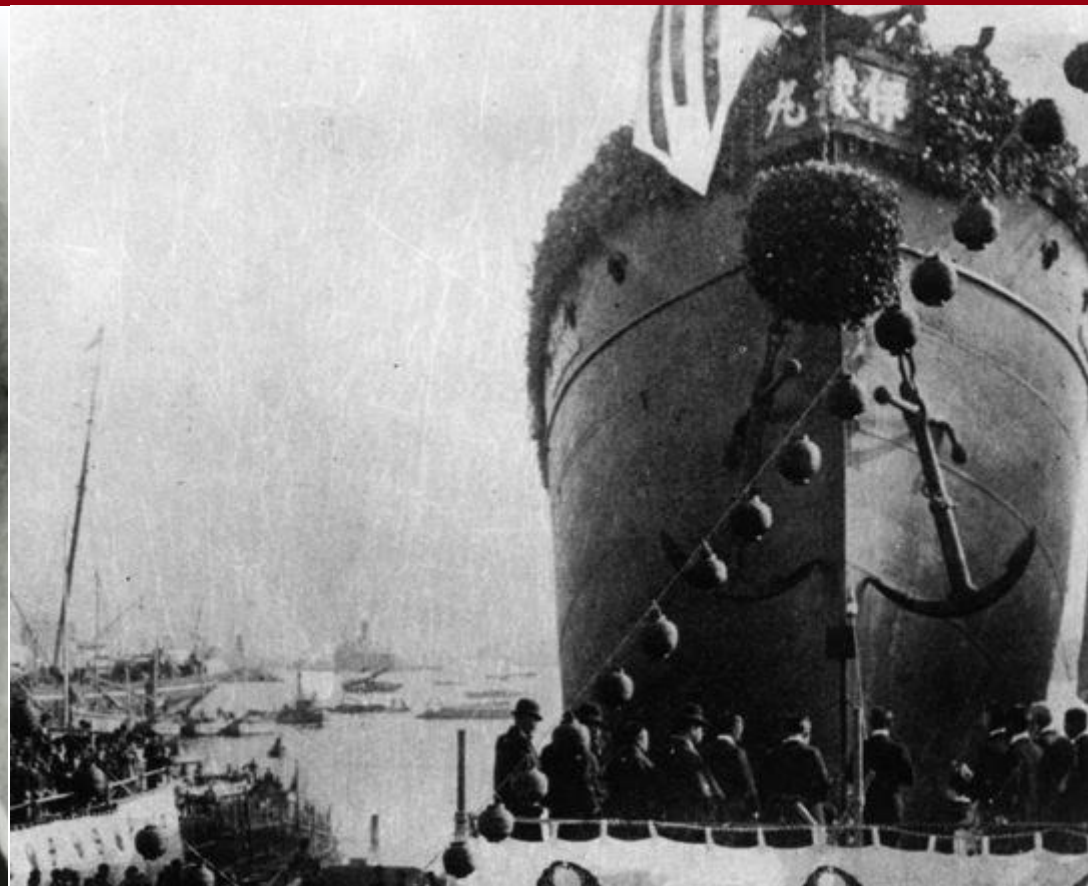
***Corporate and Robot business
Introduction***

Our roots

Founded in Tokyo in 1878, Kawasaki's development has followed the modernization history of Japan.



Shozo Kawasaki
Founder



Business Segments

Aerospace



Main Products

- Aircraft for Japan's Ministry of Defense
- Component parts for commercial aircrafts
- Commercial helicopters
- Missiles/Space equipment

20.2%

Rolling Stock



Main Products

- Electric train cars (including Shinkansen)
- Electric and diesel locomotives
- Passenger coaches
- Gigacel (high-capacity, full sealed Ni-MH battery)

10.6%

Ship & Offshore Structure



Main Products

- LNG carriers
- LPG carriers
- Offshore work vessels
- VLCCs
- Bulk carriers
- Submarines

5.8%

Robotics Division

Precision Machinery



Main Products

- Hydraulic components (pumps, motors and valves)
- Hydraulic systems for industrial use
- Hydraulic marine machinery
- Precision machinery/Electric-powered services
- Industrial robots

8.8%

Plant & Infrastructure



Main Products

- Power plants
- LNG tanks
- Industrial plants
- Crushing machines
- Tunnel boring machine
- Municipal refuse incineration plants

7.4%

Gas Turbine & Machinery



Main Products

- Jet engines
- Gas engines
- Diesel Engines
- Gas turbine systems
- Gas & steam turbines
- Marine propulsion system/Aerodynamic machinery

13.6%

Motorcycle & Engine



Main Products

- Motorcycles
- All-Terrain vehicles
- Utility vehicles
- Personal watercraft
- General purpose gasoline engines

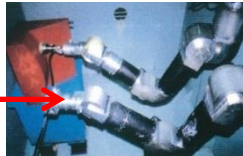
23.2%

History Of Robotics Business In KHI

In 1968, Launched Technical Corporation With UNIMATION.Ltd , As The First Maker In Japan Started Production Of Robot.



1983-90 national project
「limit operation robot」



('80)small-sized
motor-driven robot
PUMA series



('83)the first big-sized robot



('88)first recovery robot
In Japan



Robot for several industry



('12)medical robot



('13)aseptic environment
robot



('15)human cooperation
robot 「duAro」

World's 1st share of
clean robot



('69)The first industry robot in Japan 「Unimate」



Kawasaki robot in several industry sphere

Automation Automation parts



Spot welding



Arc welding



Body

Painting



Small parts

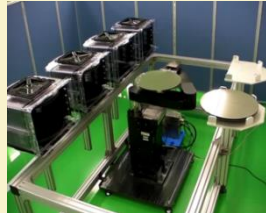


Rail

semiconductor/motor · electronic



Semiconductor machine



handling



checking



Battery checking



foods



medical



logistics

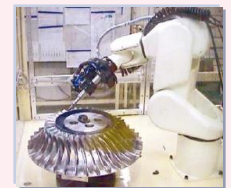


Shaping process

Others



assembling



machining



Kawasaki Robot in China





Kawasaki Solution For Automobile Industry

Kawasaki's Line Concept: “Saving”

Kawasaki's Efforts to reduce Total Cost

Initial Cost Reduction

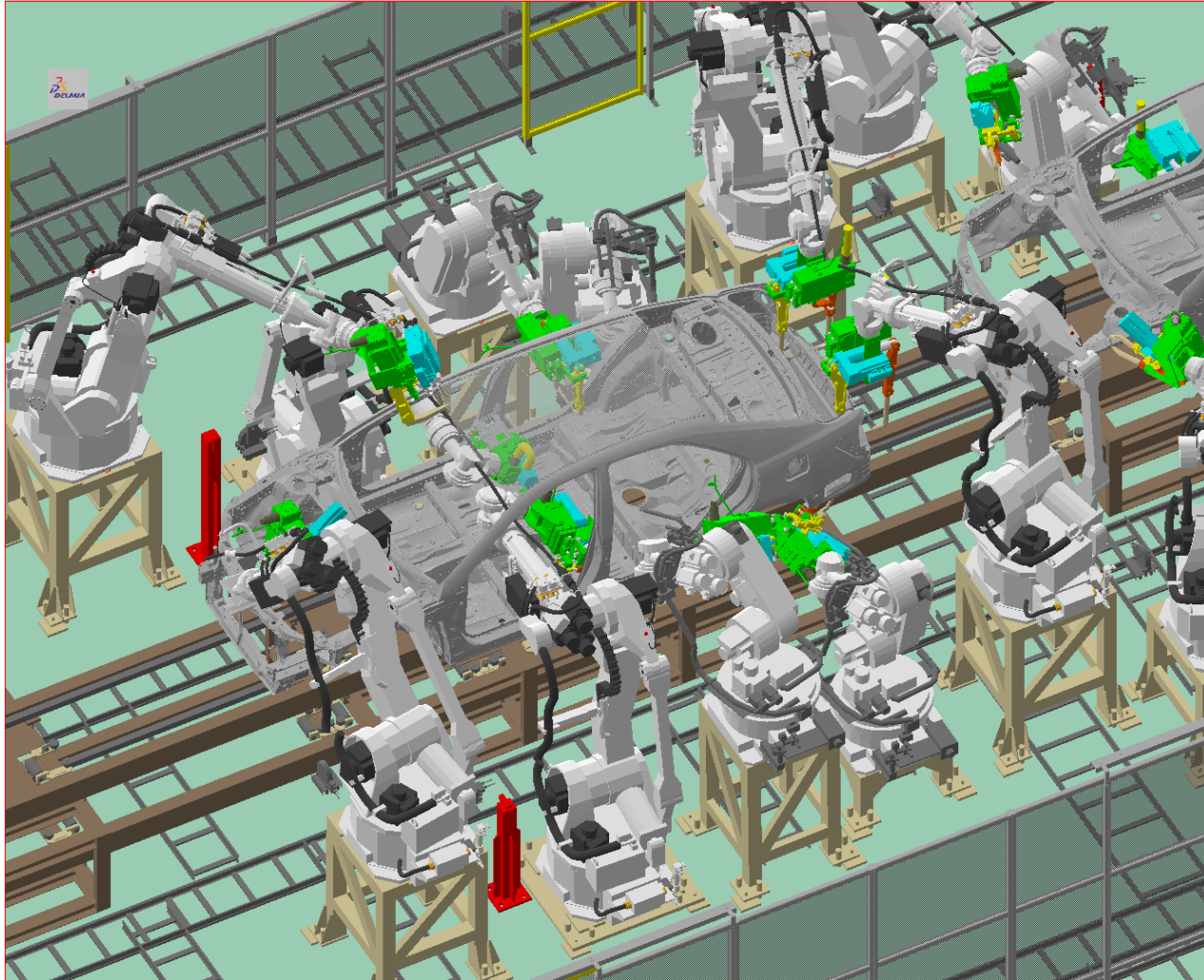
- Reduce Robot Cost
- Reduce Peripheral Device Cost
- Improve Production Efficiency
- Shorten Construction Time
- Reduce Installation Space

Running Cost Reduction

- Flexibility
- Save Workers
- Save Energy
- No Line Stop
- Maintenance Cost

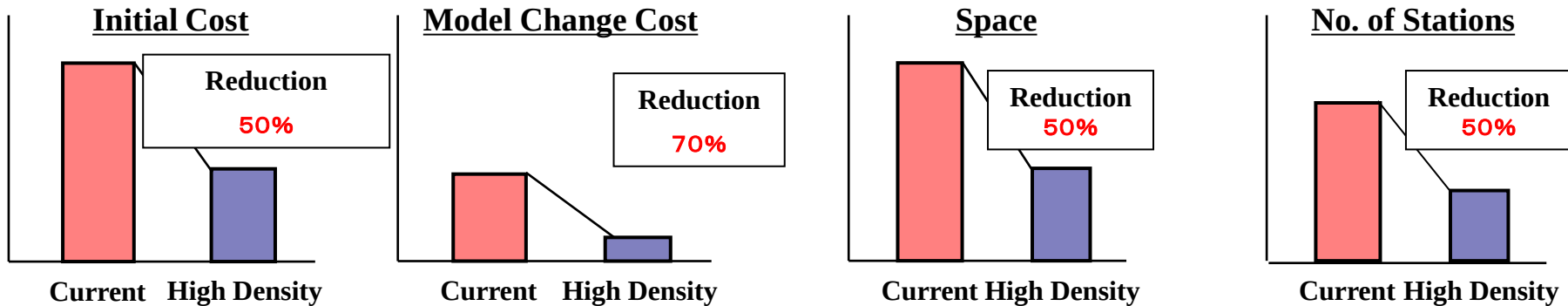
High Density Robot Installation

20 Robot Welding Cell Concept

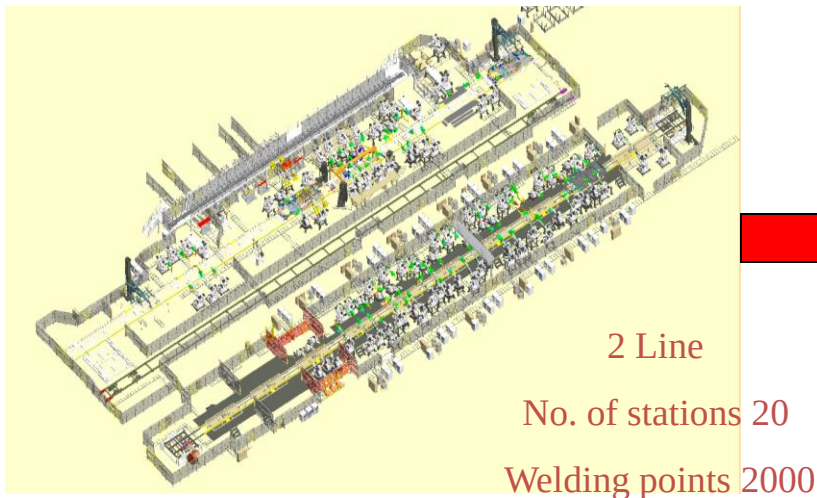


High Density Robot Installation

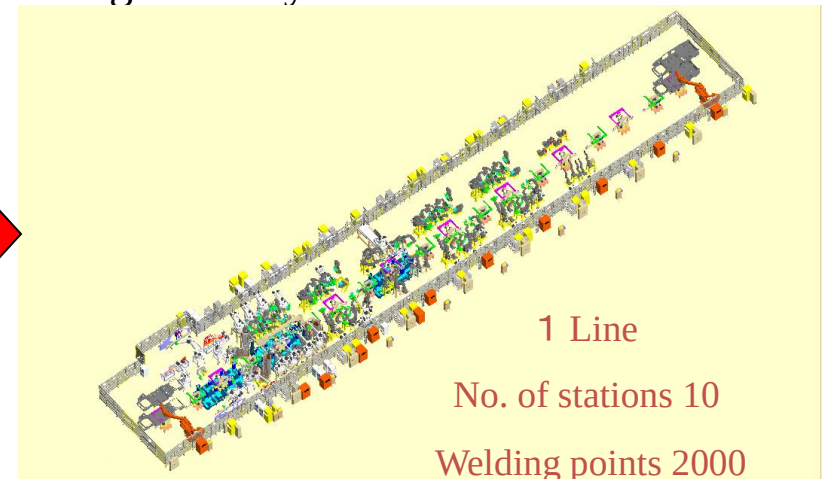
BX offers space and cost saving with **high density installation**



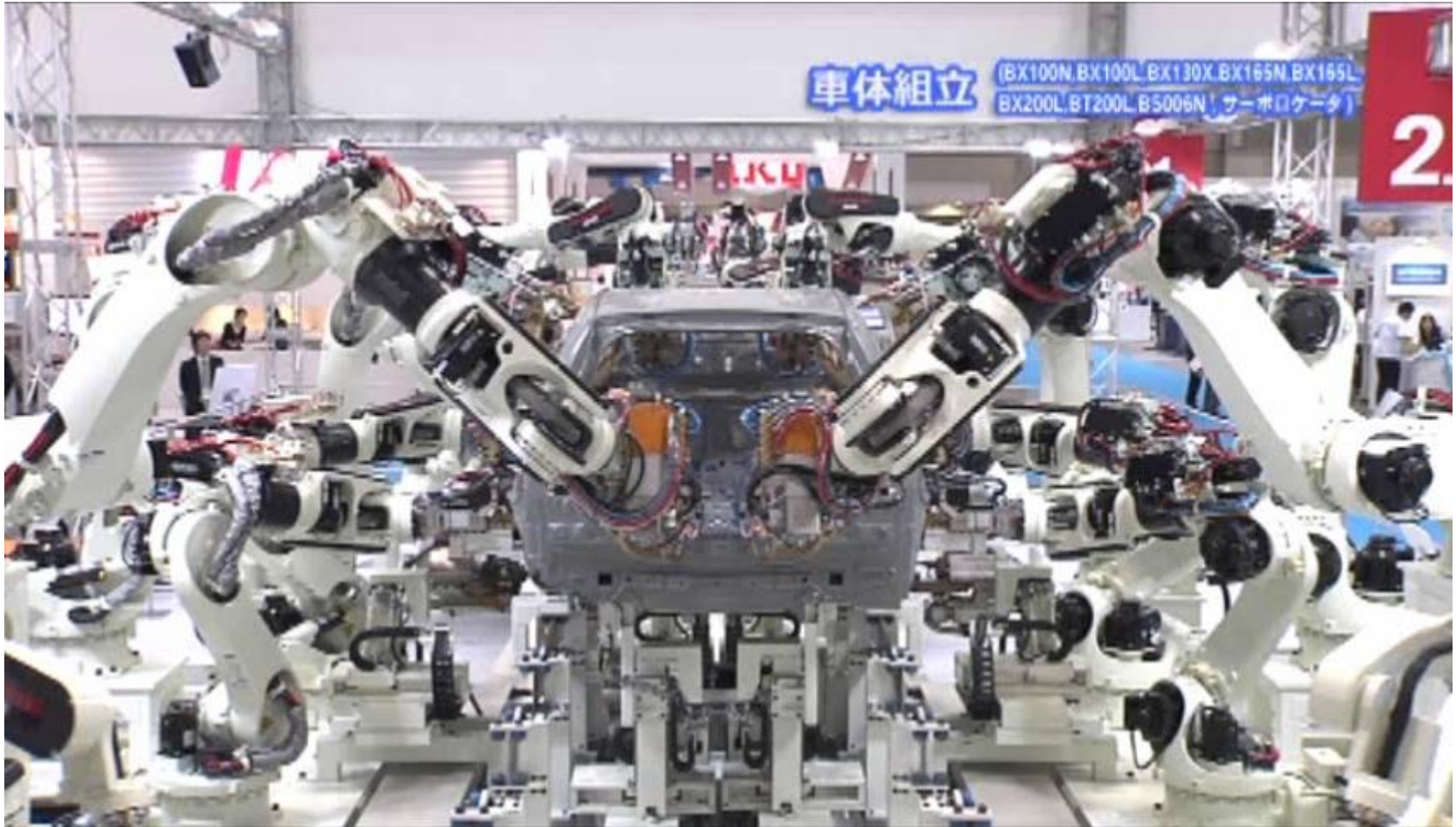
Current MB Production Line



High density MB Production Line



Industry robot are using widely around the world
(automobile body , spot welding)



Industry robot are using widely around the world
(automobile parts, assembly)





Kawasaki
Line Up for
Automobile Industry

BX Robot Features



BX300L

BX Robot Features

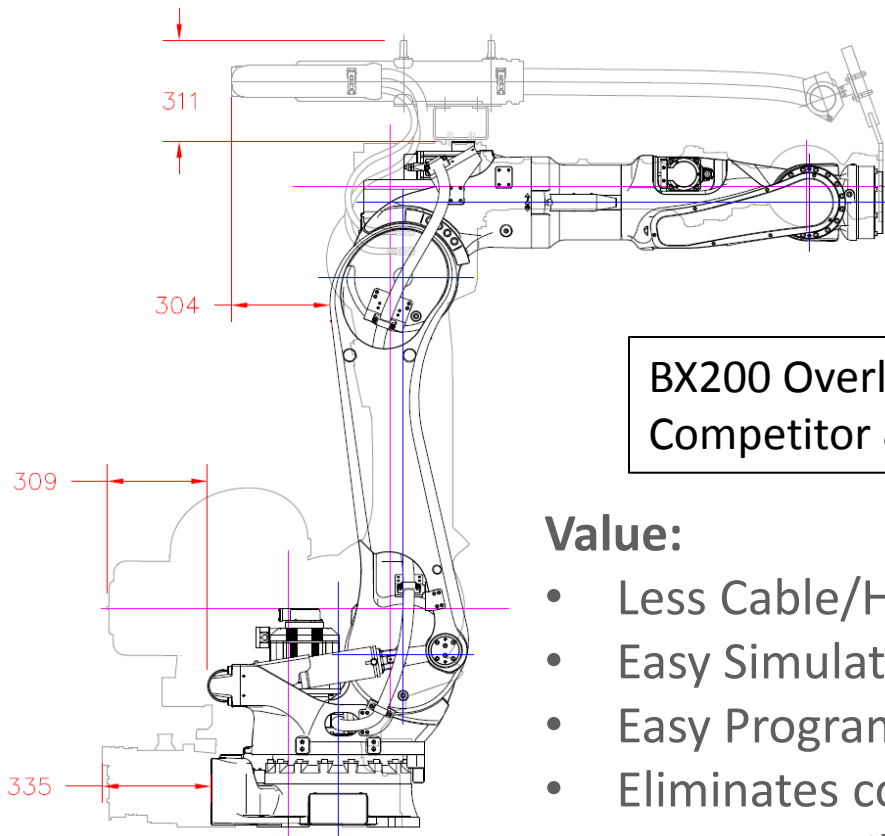
- Slim /Light-weight/ Crisp Appearance
- BX Line- Up
 - » BX200L – 2.6m reach 200kg capacity
 - » BX300L – 2.8m reach 300kg capacity
- Ethernet I/P w/ integrated safety interface
hardware and software designs are complete and
running production in Ford India (Sanand)



BX200L

Internal Dress Advantage

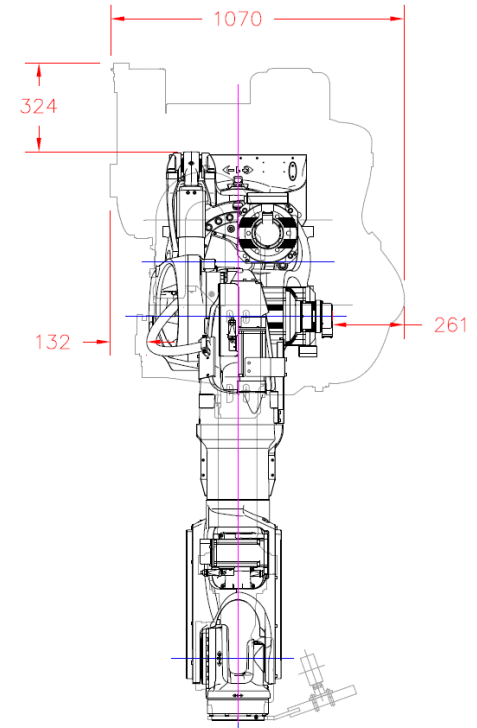
Internal Dress



BX200 Overlay with
Competitor & external dress

Value:

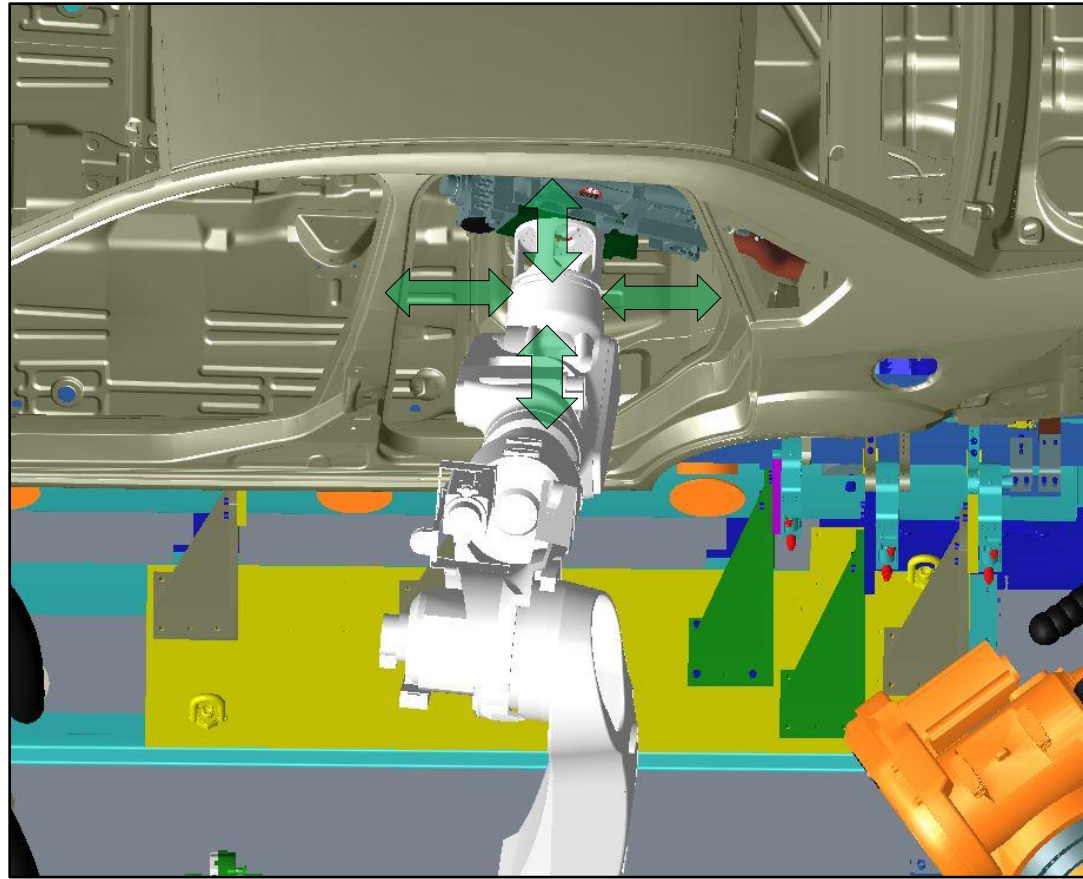
- Less Cable/Hose Interference
- Easy Simulation
- Easy Programming (offline/line up builder/plant)
- Eliminates costly dress packages
- Creates available space for high density robot installation
- Easy Maintenance



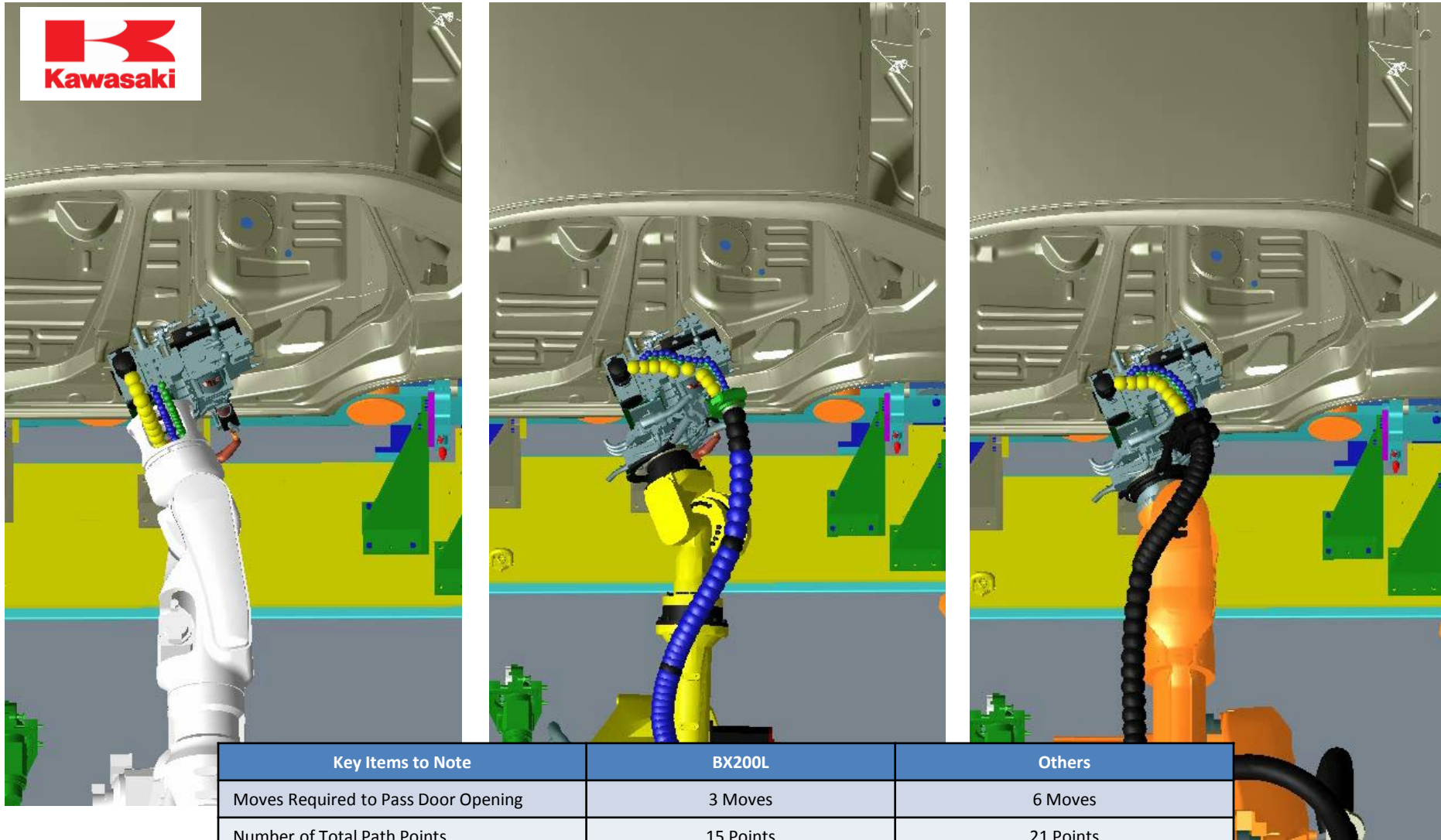
BX-Robot – Internal Dress Advantage

Value:

- Less Cable/Hose Interference
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(offline/line up builder/plant)
- Easy Maintenance

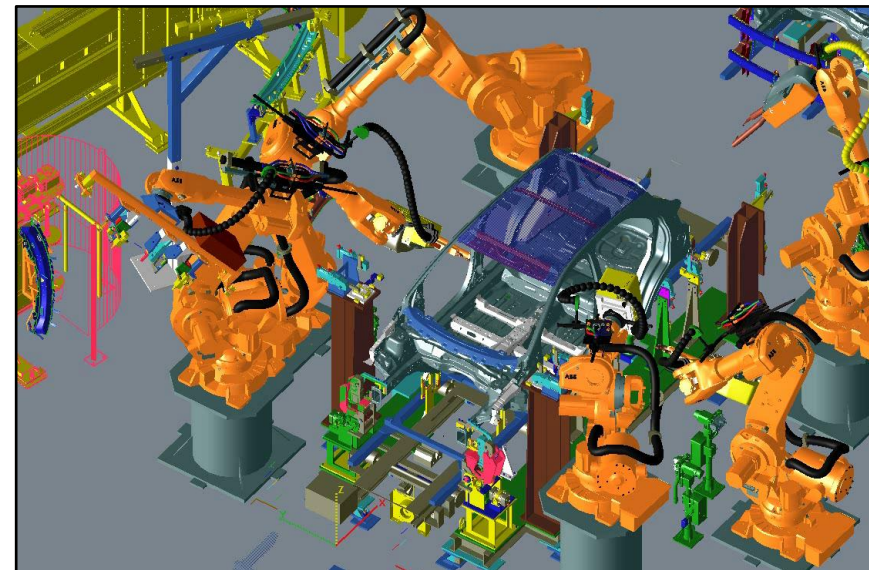
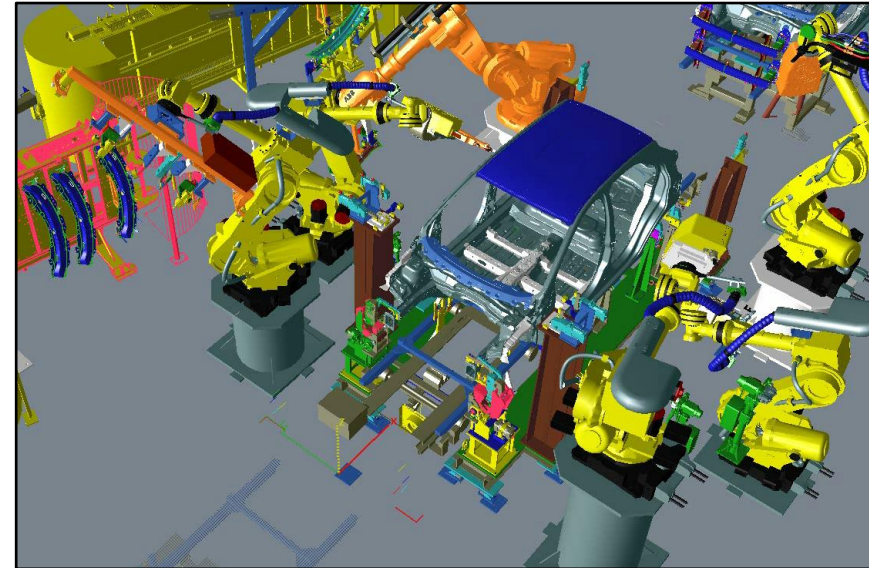
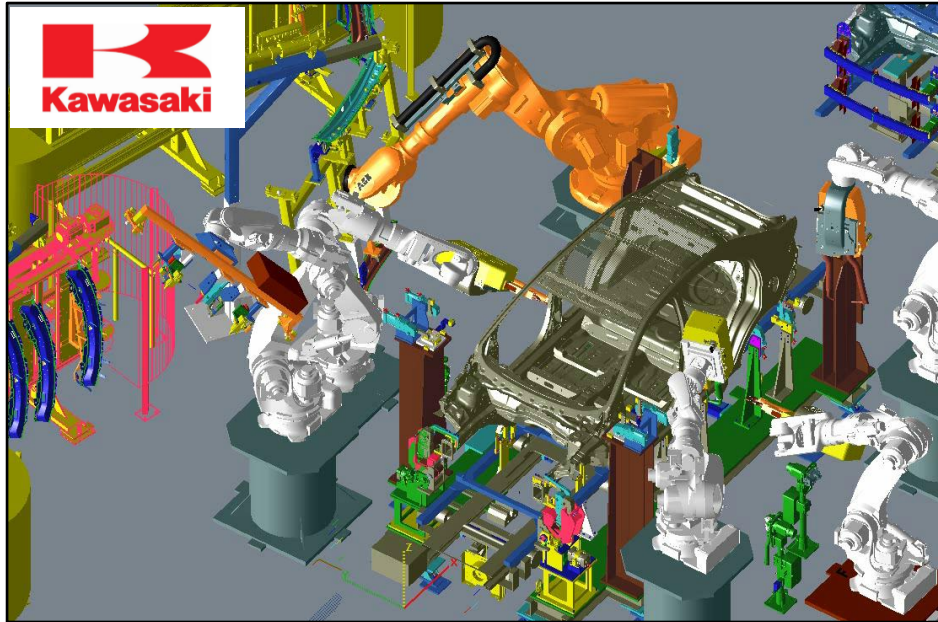


BX-Robot – Internal Dress Advantage



Key Items to Note	BX200L	Others
Moves Required to Pass Door Opening	3 Moves	6 Moves
Number of Total Path Points	15 Points	21 Points
Number of Total Path Points	6 Seconds	9-10 Seconds

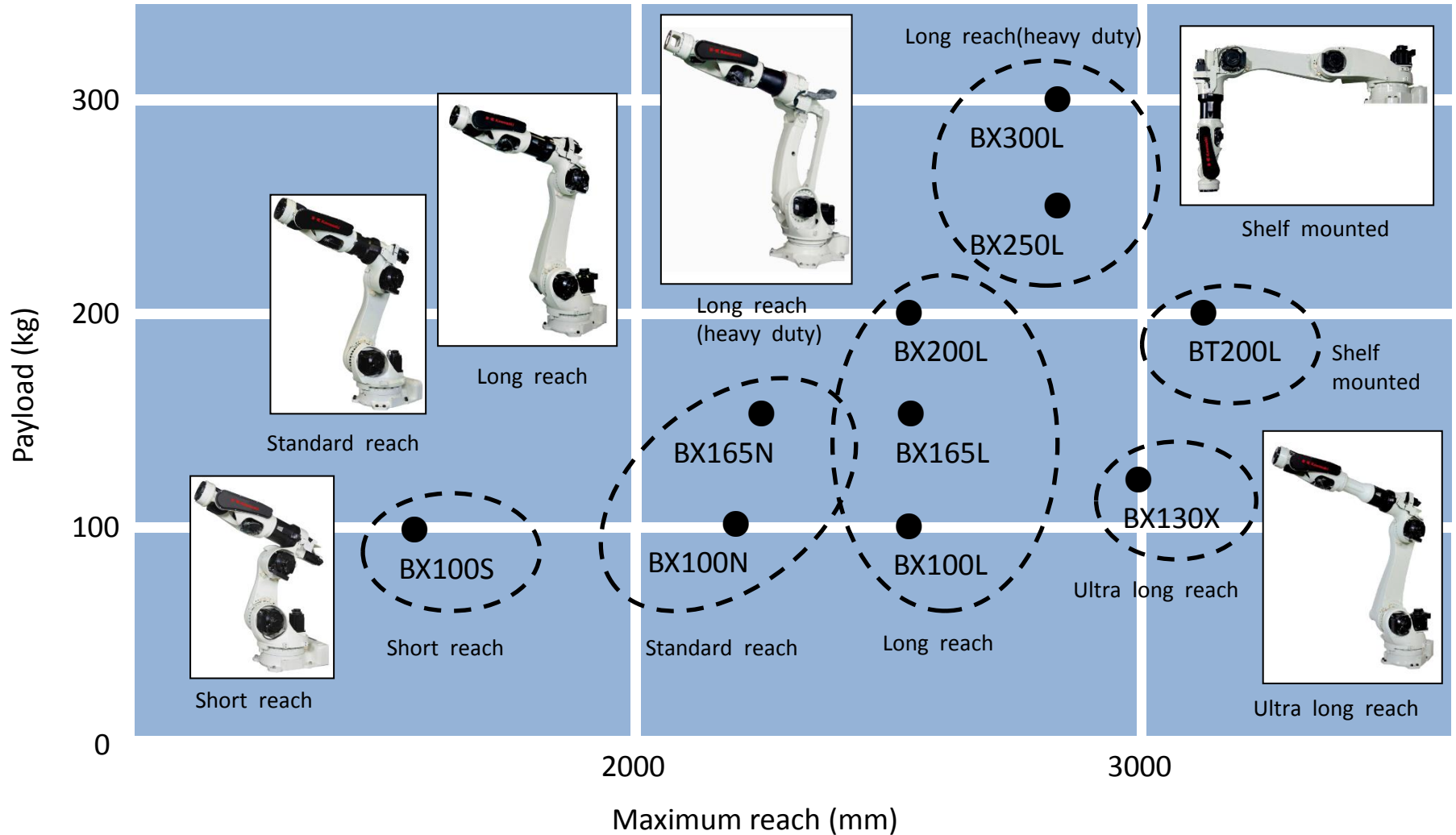
BX Robot – Internal Dress Advantage



Value:

- Less Cable/Hose Interference
- Easy Programming (offline/line up builder/plant)
- Eliminates costly dress packages
- Creates available space for high density robot installation
- Easy Maintenance

B Series Lineup



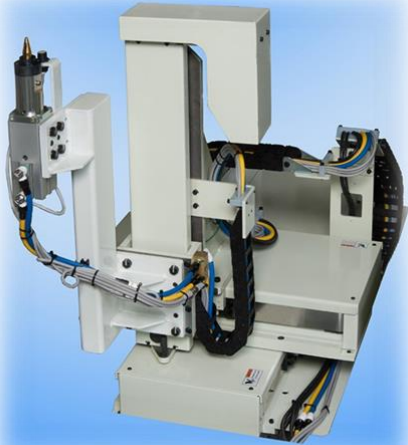
NC LOCATER : L Series Robot

L series : Compact three axis robot for Locating and Spot Welding

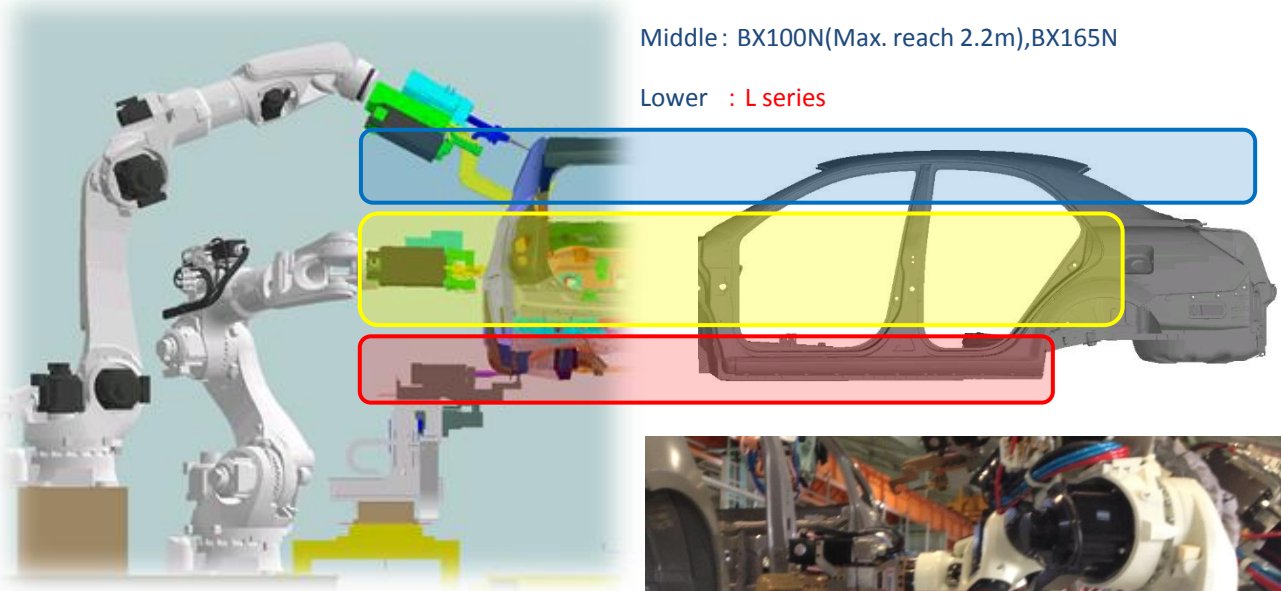
Upper : BX200L(Max.reach2.6m),BX130X,BT200L

Middle : BX100N(Max. reach 2.2m),BX165N

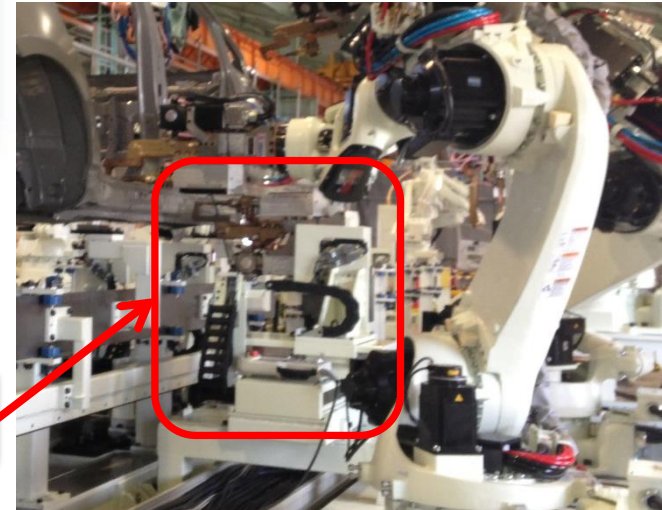
Lower : **L series**



L series



L series



NC LOCATER : L Series Robot



Transfer by MG Robots(Payload:1t or 1.5t)



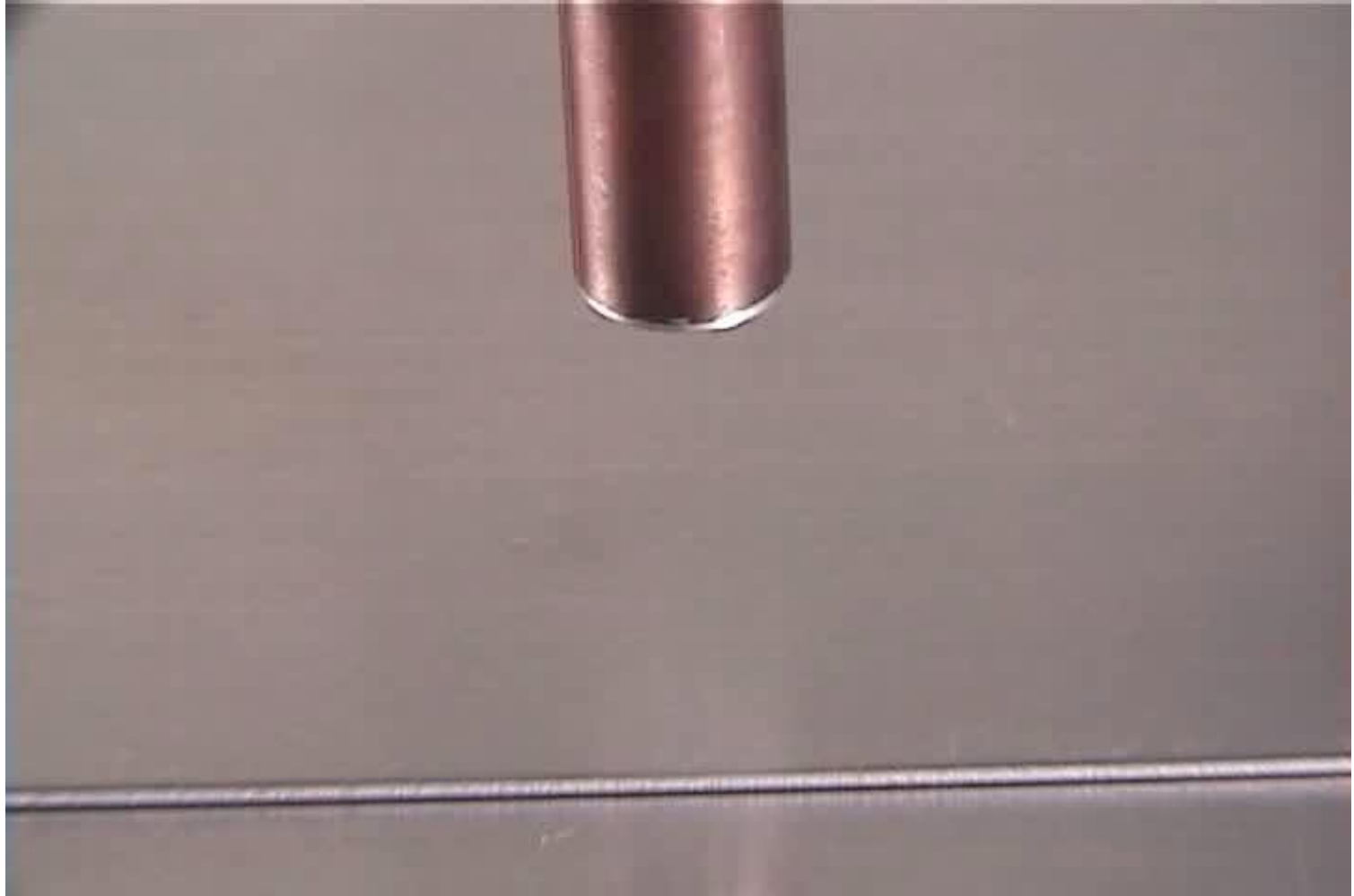
Value:
Body transfer/lifter replacement

FSJ robot system

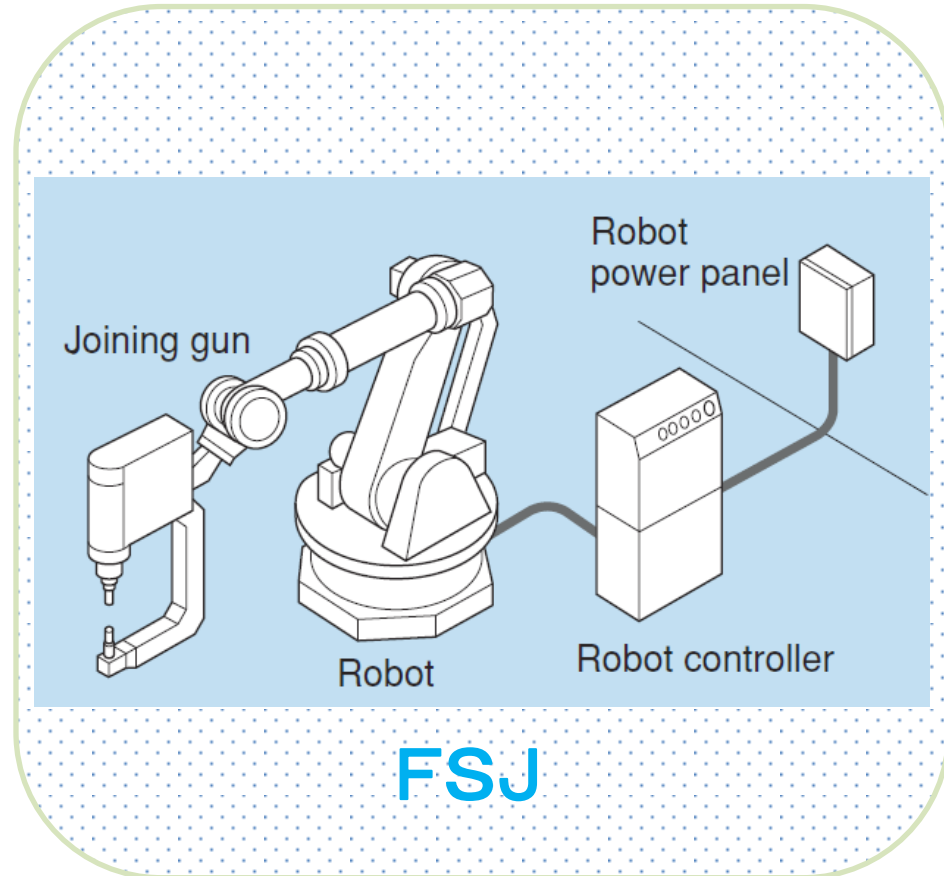
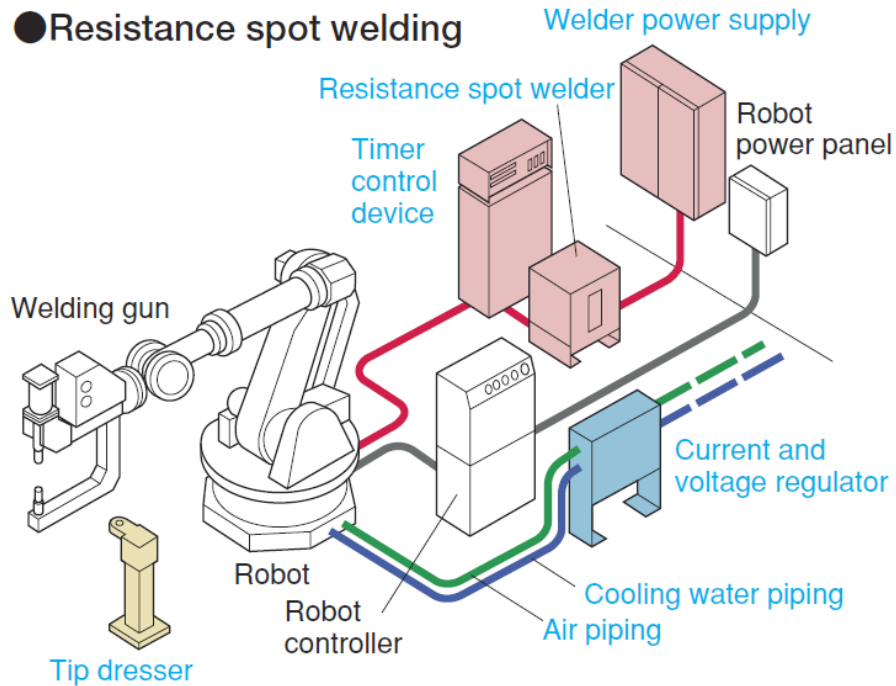


- A multi-articulated robot carries an FSJ gun with C shaped backing arm.
- FSJ gun is equipped with two servo-motors for turning and plunging the pin tool.
- Two servo-motors are driven by a controller simultaneously with robot arm motion.
Additional control device of FSJ gun is not necessary.

Joining process



Comparison between FSJ and RSW systems



FSJ – Joining for Future Materials

Trend of Car Body

Collision safety

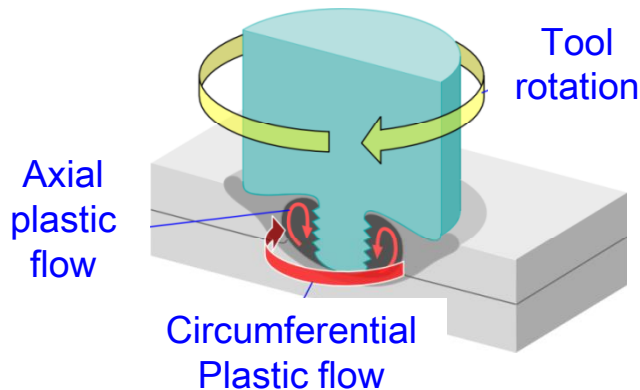
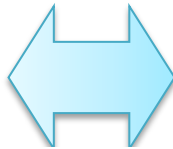


High strength → Heavy

Fuel efficient



Light weight



Joining of High strength steel
(Hot stamped material)

Joining of different materials
(Steel – Aluminum)
(Aluminum – CFRP)

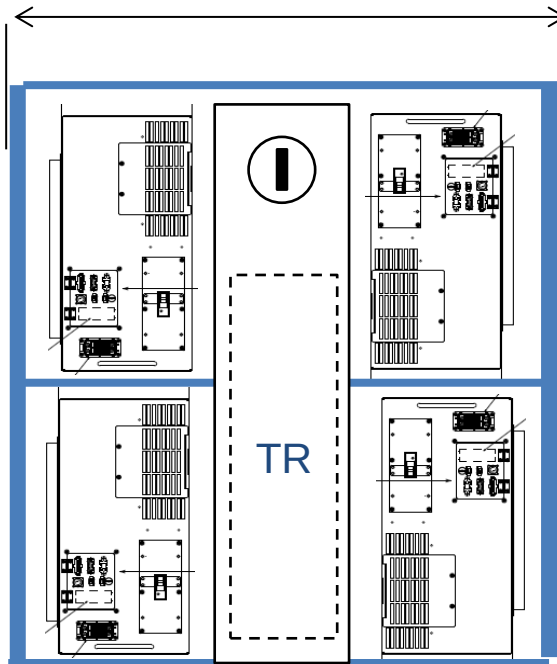
FSJ

Universal Controller



800

1200



- **Space Minimizing**

- Universal controller has been drastically downsized (41% reduced). Allows for stackable layout (vertical or Horizontal) to minimize the required space.

- **High Reliability**

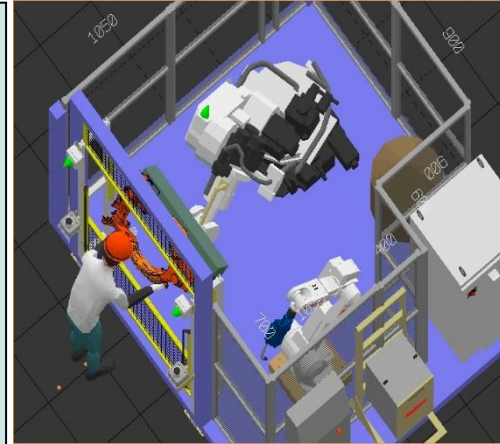
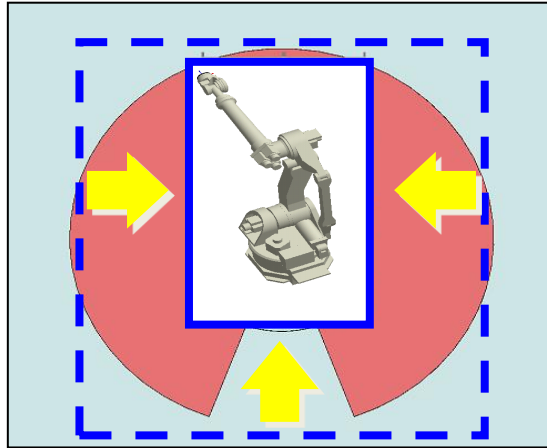
- Due to the reduced number of parts and replacement of motor contractors improved reliability is obtained.

- **MTTR Shortened**

- Controller is designed to be replaced as a total unit. Special functions provided for software and configuration.

Safety Rated Programmable Limits (Cubic-S)

Save Safety
fence space



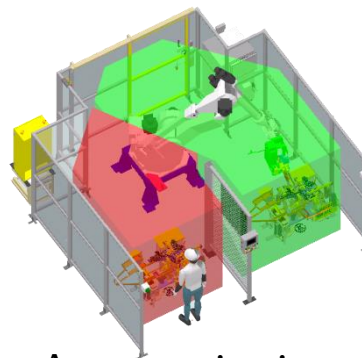
Work near by
the robot



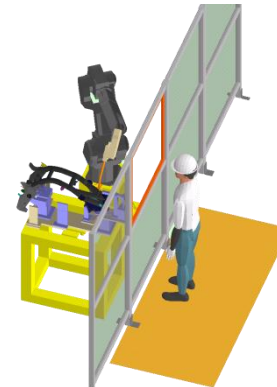
Safety monitoring
unit(Cubic-S)



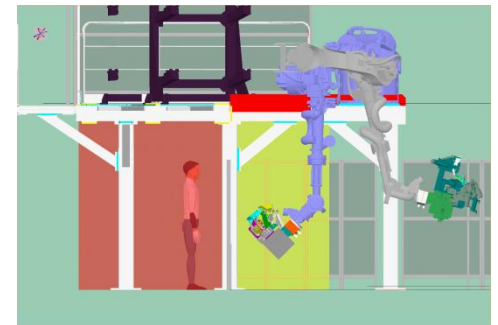
Certification
ISO 10218-1



Area monitoring



Speed
Monitoring



Stand Still
Monitoring

Support Tool - IoT

TREND Manager

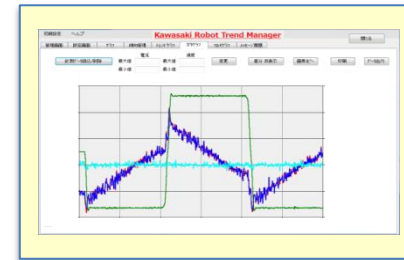
True REMote maintenance for Numerical Diagnosis

Data collection and analysis

Remote & manual operation

Preventive maintenance by failure prediction

Collect data and analyze the robot state



Error notification by E-mail

Automatic E-mail delivery

Remote troubleshooting

Remote support through the network (IoT)





Kawasaki Solution For General Industry

Press working

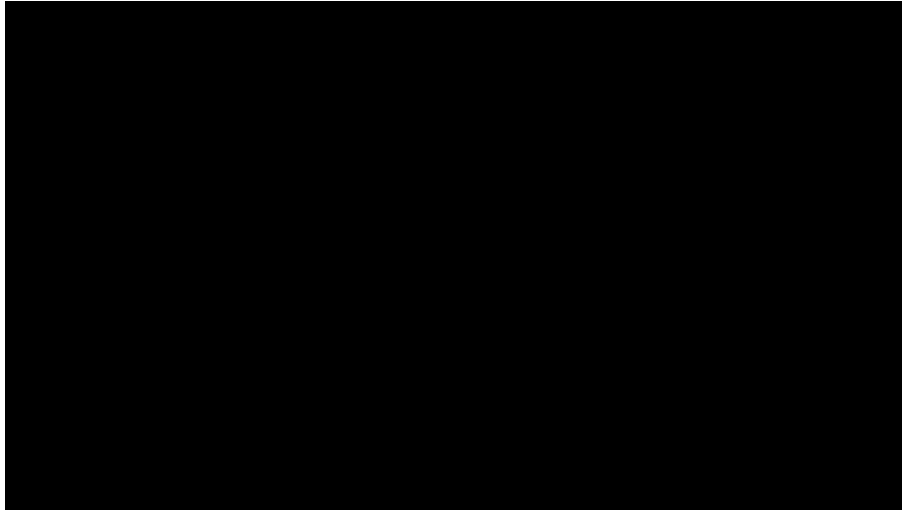


Product: Server case
Robot: ZX130S × 20
End User: KARRIE Group
System integrator: CUIFENG Automation



Product: air-conditioner
Robot: RS50N × 4
End User: Midea Group
System Integrator: LongShen Automation

Injection molding and burring



Product: air-conditionor
Robot: RS20N $\times$ 1
End User: Midea Group
System Integrator: LongShen Automation



Product: washing machine
Robot: ZX130L $\times$ 1
End User: Midea Group
System Integrator: LongShen Automation

Grinding and polishing

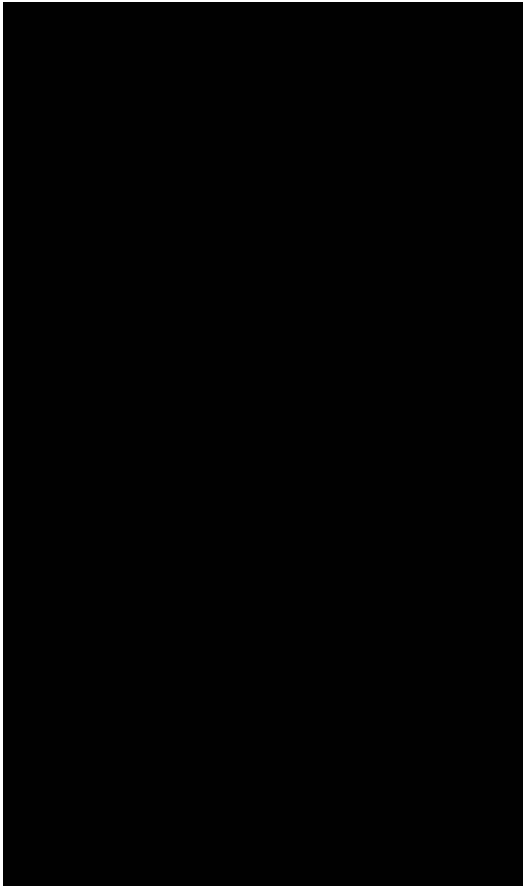


Product: car roof
Robot: RS80N×1
System Integrator: DAN (ITALY)



Product: chair base
Robot: ZX130S×1
System Integrator: DAN (ITALY)

assembling

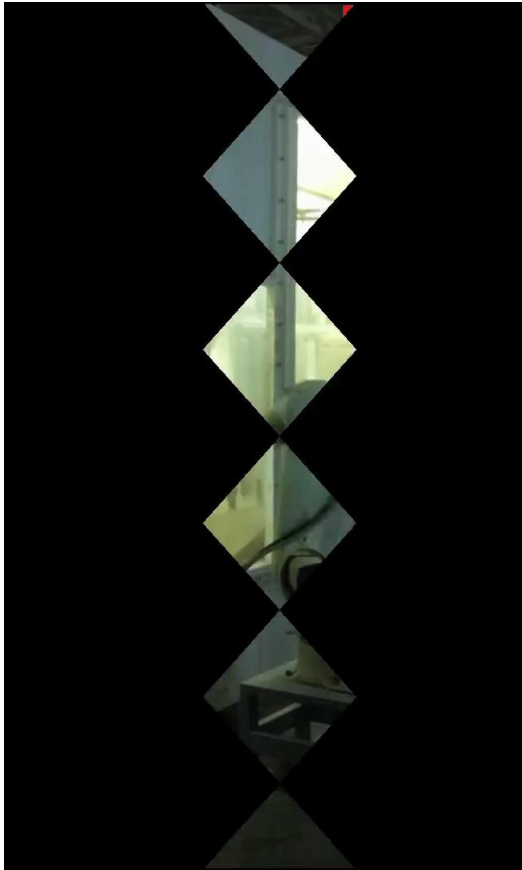


Product: washing machine
Robot: RS50N $\times$ 1、RS05L $\times$ 1、YF03N $\times$ 1
System Integrator: Longshen Automation

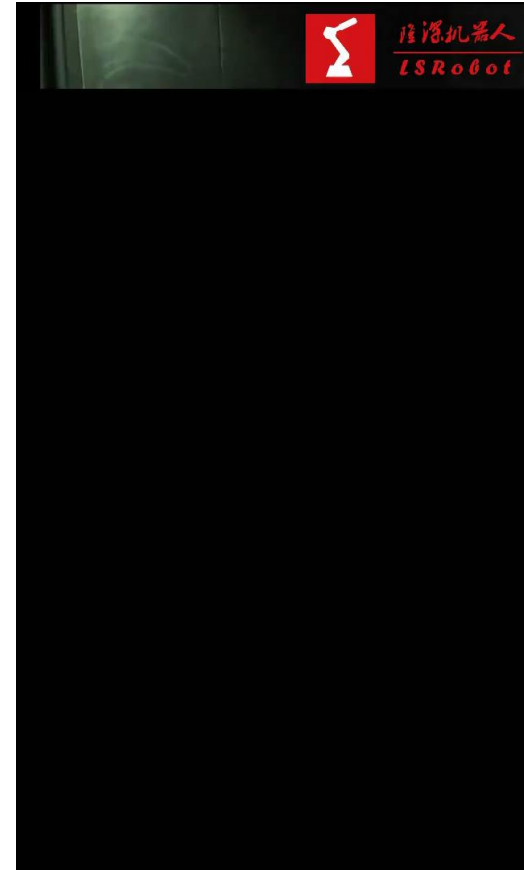


Product: micro oven
Robot: RS20N $\times$ 1
System Integrator: Longshen Automation

painting



Product: air-conditionor
Robot: RS20N × 2
System Integrator: Longshen Automation



Product: micro oven
Robot: RS05L × 1
System Integrator: Longshen Automation

Kawasaki. working as one for the good of the planet
“Global Kawasaki”