



Rear Frame Manufacturing

FLEXIBILITY

- ✓ Flexibility
- ✓ Common tool base
- ✓ Quick Change Over

OPTIMIZED DESIGN WELD CELL DESIGN

- ✓ Optimized Design Weld Cell Design
- ✓ 4 Robots per cell
- ✓ Tools designed to balance Robotic Weld time
- ✓ Reduced Capital , Footprint, and Labor

MULTIPLE CAPABILITIES

- ✓ Multiple Capabilities
- ✓ CNC Tube Bending with Robotic Handling
- ✓ Robotic Arc and Spot Welding
- ✓ Projection Welding
- ✓ Riveting and Torque Fastening





Rear Frame Tube Bending

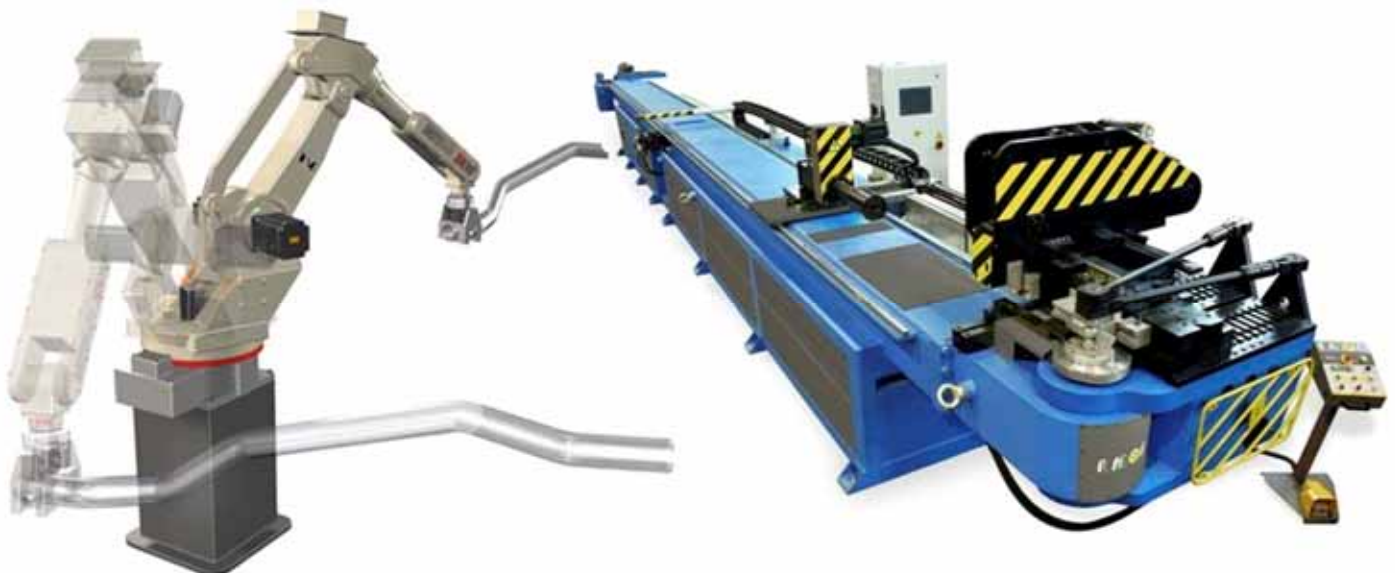
Wayne Trail Dual Head Tube Bend

FLEXIBILITY

- ✓ Flexible
- ✓ 0.75" to 3" Diameter
- ✓ 15" to 124" Length
- ✓ Quick Change Over

OPTIMIZED DESIGN

- ✓ Optimized Design
- ✓ Dual Head Bending with Transfer
- ✓ Robotic Off Load
- ✓ Integrated Secondary Press and Punch Operations





Seat Offload Robot

FLEXIBILITY

- ✓ Powerful high-speed six axis robot
- ✓ Quick Change Over between Seat versions
- ✓ For all versions of Tacoma and Tundra Front Seats

OPTIMIZED DESIGN

- ✓ 1 Robotic Off Load
- ✓ 1 End of Arm Tool designed for all Seat versions Passenger and Driver
- ✓ Cycle Time reduced by 52%





OHS

FLEXIBILITY

- ✓ Yamaha 3 axis Glue Robot
- ✓ For all versions of Tacoma and Tundra

OPTIMIZED DESIGN

- ✓ 1 Robotic Glue applicator for Tacoma and Tundra Headliner
- ✓ Wire & NVH Stations
- ✓ EOL Testers
- ✓ Robotic fixture station
- ✓ Laser location lights
- ✓ Shipping Monorail System with TMMTX



Seat Assembly

Robotic Steaming

Standardized Work

- ✓ Repeatable Processing

FLEXIBILITY

- ✓ Can be programmed for multiple seat styles

OPTIMIZED DESIGN

- ✓ Minimizes Labor
- ✓ Takes the space of only one Build Station



Headliners

FLEXIBILITY

- ✓ Can accommodate multiple composites
- ✓ Runs all Cab Sizes with no change over

OPTIMIZED DESIGN

- ✓ Infrared Thermoforming
- ✓ 50,000 PSI Waterjet
- ✓ Edgefolding
- ✓ Improved Ergonomics



Foam

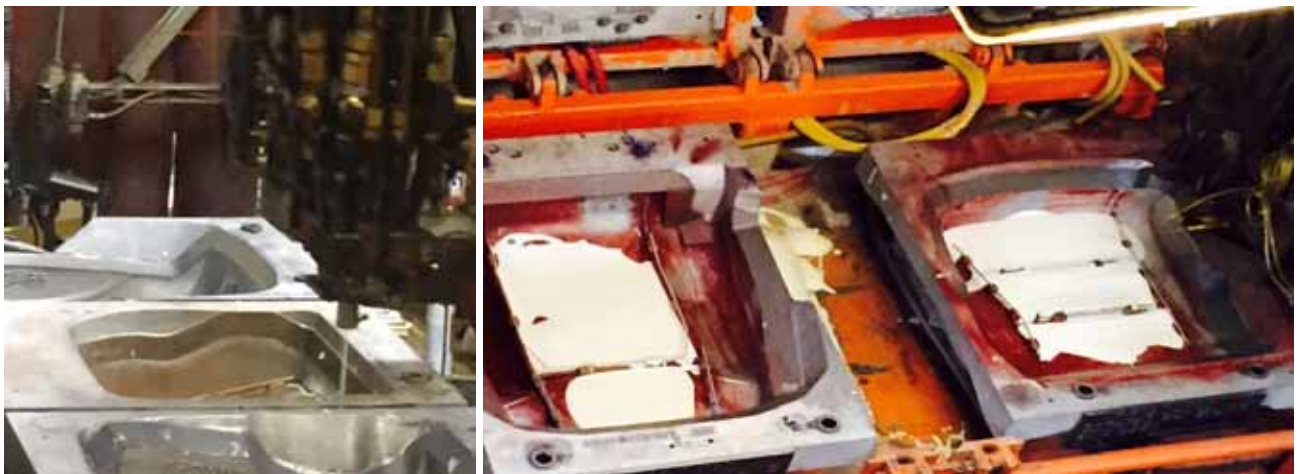
12 Station Carousel with Robotic Pour

FLEXIBILITY

- ✓ Six Component Metering System
- ✓ Robot can be programmed for any pattern
- ✓ Capable of running multiple formulations and densities

OPTIMIZED DESIGN

- ✓ Servo Controlled Carousel with Automatic Robot Offset
- ✓ Quick Change Over Tooling
- ✓ IFIX controlled Robot Pouring



Tacoma Door Assembly

Cassette Based Sonic Weld System

FLEXIBILITY

- ✓ Robots can be programmed to run any door
- ✓ Runs Driver and Passenger simultaneously

OPTIMIZED DESIGN

- ✓ New Doors only require new Cassettes
- ✓ Automatic Clip Installation



Tundra Door Assembly

Flex Base Sonic Welding Stations

FLEXIBILITY

- ✓ Tooling can be changed out to run different doors

OPTIMIZED DESIGN

- ✓ Small Foot Print
- ✓ Fast Cycle Times
- ✓ Sonic Welding and End of Line Testing combined in one station



Injection Molding

1. QT2700 RS170/115 Husky Quadloc Tandem
2. Q1350 RS115/115 Husky Quadloc
3. Toshiba ISF2750 DV10-150A
4. Toshiba ISF2750 DV10-150A



FACTS:

- Machines: We have 4 machines. 2 Toshiba 2750 Ton Hydraulic presses. A Husky Quadloc 1350 Metric Ton Hydraulic and a Husky Quadloc 2700 Metric Ton Tandem Hydraulic Press
- Material types: We use Natural Polypropylene as well as a 30% Talc filled Polypropylene. We use a 2.5% UCC-205 black color mix
- Number of tools - We run high volume production on 13 tools(TOYOTA TUNDRA and TACOMA), and run occasional service on another 20 tools
- Number of shots per day: Between the 4 machines we average about 5630 parts per day

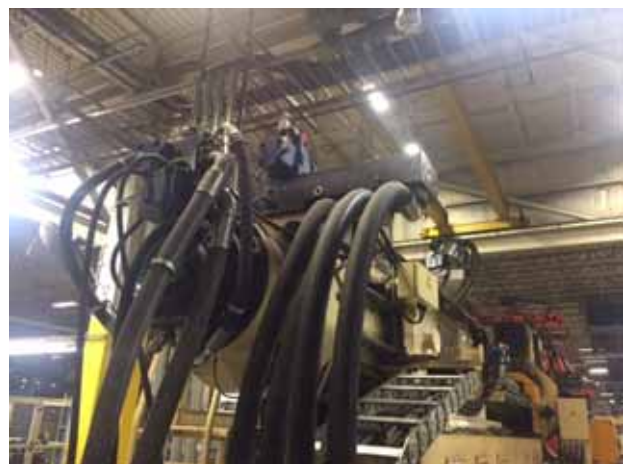
Machine to eDart Communication

- All 4 machine control their valve gates through the eDart
- All 4 machines communicate with functional tool transducers
- Gate valve control and Template



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Injection Unit Control



Temperature Control

**Thermolator for mold
Temperature control**



**Hot Runner
Temperature controller**



MOLD



Tundra Door

- Conair Trueblend

