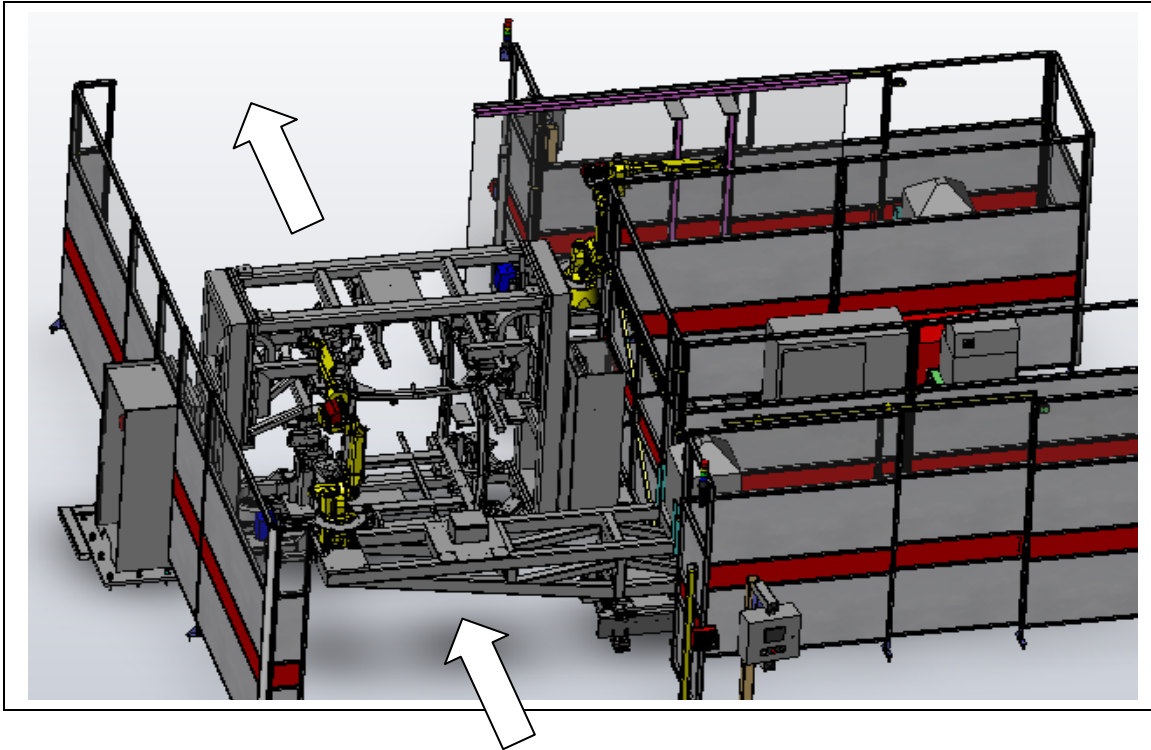


Genesis Case Study #: J5132-001
Application: Custom System and Fixture Design
Market Segment: Industrial
Product: Tractor Cab
Cycletime: 5.8 min.



Summary

Design a custom workcell to allow a “Flow-Through” approach for material handing. Keep the floor clean, and without pits, troughs or covers for operators to work around. Allow clearance for over-head material handling. And do all of this with a fixture sturdy enough to properly locate several sub assemblies, manipulate the part to proper welding positions, and meet a cycle time goal and within a specified budget. Many concepts were proposed and reviewed before settling on this approach.

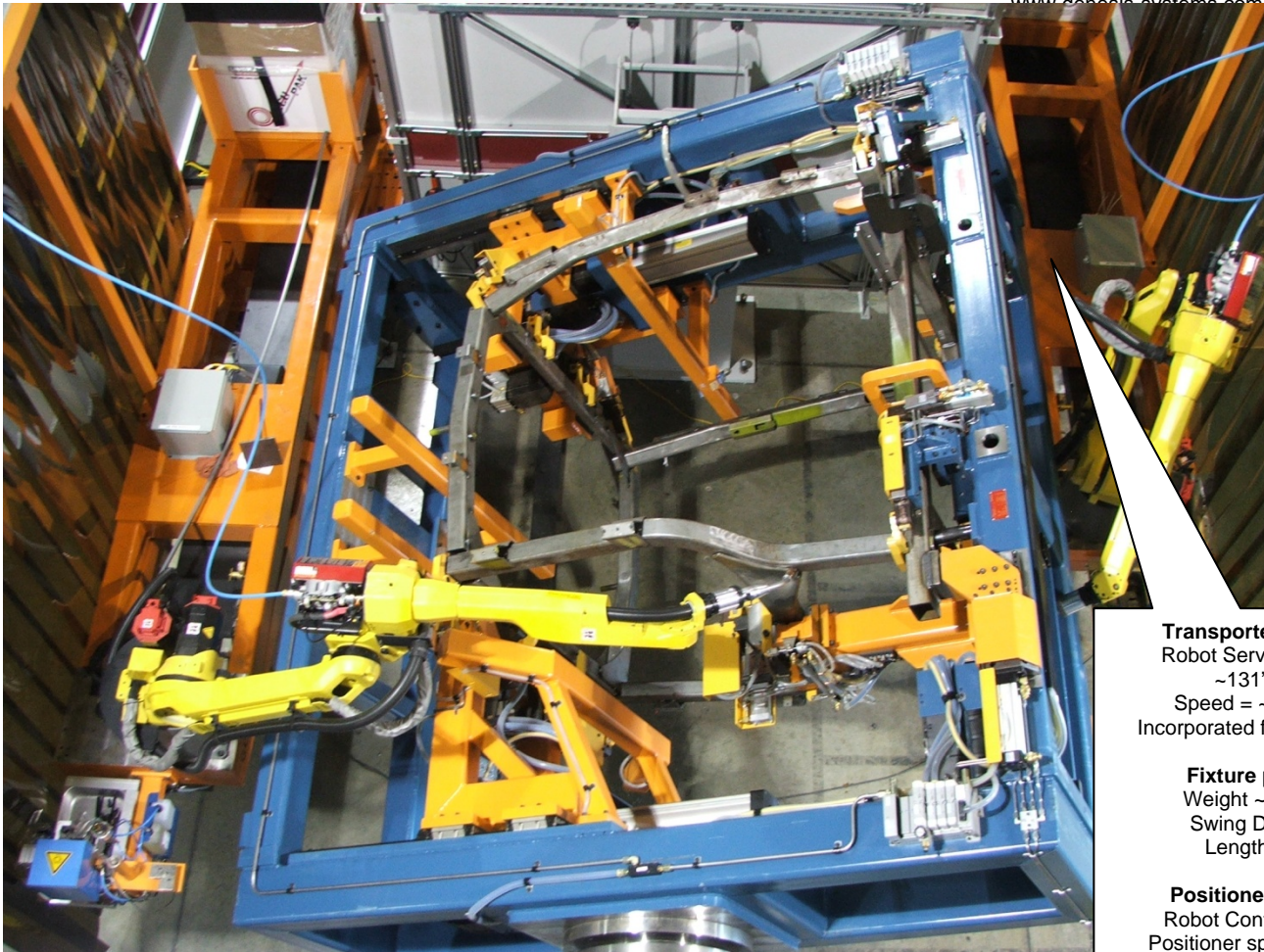
Programming of these large, heavily welded, industrial tractor cab required extended lead time and a large amount of programming time. To reduce the lead time, Genesis incorporated Fanuc’s WeldPRO for offline programming. The 6 welded sub assemblies and 1 rear cross member contained over 52 welds, 2,450mm of weld length, with an assortment of joint configurations. This project required the use of (2) Fanuc ArcMate 120iC/10L on independent 131” travel servo tracks. Using WeldPRO offline programming software gives the ability to program the parts while the machine was being built. In some instances up to four weeks can be removed from the lead time. In addition, the 2nd part can be programmed while robots were occupied on the first part.

Project Challenges

- Deflection calculation on cantilever style servo tracks with robot riser. Multiple methods were investigated to get the rigidity to weight ratios. Too heavy would slow down the transporter speed, too weak could cause deflection during weave welding.
- Customers Request for The Material flow straight thru the system method, no work pits or troughs in the floor.
- The ability for an overhead load and unload material handler.
- Multiple variation of sub welded part assemblies all loaded and held in location rigidly while welding.
- Try to reduce the floor space as much as possible with this approach (Cell controls located between track park stations).

Genesis Solution

- SolidWorks Cell design incorporating all major features.
- A FEA stress analysis was performed on the servo carriage robot frame.
- WeldPRO Reach Analysis for fixture and system design verification.
- Custom heights of head and tailstock to accept the extremely large swing diameter.
- The use of the servo tracks retracting the robots completely out of the material flow.
- Fanuc iR vision integrated for assembly identification using the correct material thickness.

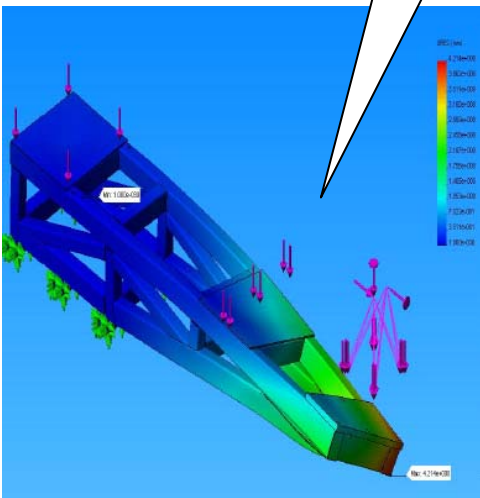


Transporter Package:
 Robot Servo Controlled
 ~131" travel
 Speed = ~ 24 in/sec.
 Incorporated flash protection

Fixture package:
 Weight ~12,000lbs
 Swing Dia. ~120"
 Length ~ 154"

Positioner Package:
 Robot Controller Servo
 Positioner speed ~ 4 RPM

Stress analysis
 Test on cantilever
 Robot carriage



Camera package
 designed in as part
 of the fixture sensor
 package

