Flexible Fixturing
Why, How and How Much

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Flexible Fixturing

Dedicated Fixtures?
Flexible Fixtures?
Fixtureless Fixtures?
Flexible Fixturing

- What is Flexible Fixturing?
- What is Fixtureless Welding?
- What are the Benefits of each?
- How much?
- How do I figure out what style is best for my part?
Flexible Fixturing

What is Flexible Fixturing?

What is Fixtureless Welding?

What are the Benefits of each?

How do I figure out what style is best for my part?

How much?
What is Flexible Fixturing?

Flexible fixtures are fixtures that allow multiple parts to run across the same main frame with change-out details and or automated adjustments.
Flexible Fixturing

What is Flexible Fixturing?

What is Fixtureless Welding?

What are the Benefits of each?

How do I figure out what style is best for my part?

How much?
What is Fixtureless Welding?

Fixtureless welding uses robotic “end of arm” tooling instead of traditional dedicated tooling.
Flexible Fixturing

- What is Flexible Fixturing?
- What is Fixtureless Welding?
- How much?
- How do I figure out what style is best for my part?
- What are the Benefits of each?

NRAWC
National Robotic Arc Welding Conference
The Benefits of Flexible Fixtures

Reduce

- Changeover time from dedicated Tooling
- Delivery Times
- Tooling Expenditures
- Tooling Content

Benefits

- Lean Manufacturing
- Shorter Delivery Times
- Less work in progress
The Benefits of Fixtureless Welding

Reduce

- Changeover time from flexible tooling
- Delivery time to market
- Capital Expenditures
- Tooling Content

Benefits

- Lean Manufacturing
- Shorter delivery times
- Less work in progress
- Weld Position / Better Quality
Flexible Fixturing

What is Flexible Fixturing?

What is Fixtureless Welding?

What are the Benefits of each?

How do I figure out what style is best for my part?

How much?
Flexible Tooling Scenario 1

- Flexible Pallet Tooling Cell
- Multiple Part size from one tool
- Low part variation with high volume
- Linear fixture adjustments
Flexible Tooling Scenario 1

How

• Flexible Pallet Tooling Cell
• Multiple Part size from one common tool
• Low part geometry variation with high volume
• Large part size variation - Linear
• Part fit flexible concept
• Part width change across models
• Upstream cells utilize flexible fixture design
• Down stream cell utilizes both fixtureless and flexible tooling
• Multiple process
  • Mig welding
  • Spot welding
  • Material handling
Flexible Tooling Scenario 1
Flexible Tooling Scenario 2

- Flexible Tank Cap Tooling Cell
- Multiple Part size from one tool
- medium part variation with low volume
Flexible Tooling Scenario 2
How

• Flexible Tank Cap Tooling Cell
• Multiple Part size from one common tool
• medium part variation with low volume
• Large part size variation
• Part fit flexible concept
• Multiple fittings that are common from large to small tank Cap
• Tolerance of system met customer needs
• Multi process
  • Mig welding
  • Plasma cutting
  • Material handling
Flexible Tooling Scenario 2
Flexible Tooling Scenario 3

- Flexible Tank Cell
- Multiple Part size from many tools
- High part variation with high volume
Flexible Tooling Scenario 3

How

- Flexible Tank Cell
- Multiple Part size from many tools
- High part variation with high volume
- Large part size variation
- Part fit flexible/ fixtureless concept
- Multiple fittings that are common from large to small tank
- Tolerance of system met customer needs
- Multi Robot
- Multi process
  - Welding
  - 2d vision
  - 3d laser tracking
  - Material handling
Flexible Tooling Scenario 3
Flexible Tooling Scenario 3
Summary

- Flexible tooling and fixtureless tooling can be used together
- Flexible tooling is usually high part volume with linear part variation
- Fixtureless tooling can be used when part quantity is high or low.
- Both types of tooling can reduce capital investment
- Both types of tooling can improve ROI
- Both types of tooling can reduce build times
- Fixtureless tooling can greatly reduce capital if part variation is manageable.
Questions