Hygienic Design & Fabrication Considerations and Techniques
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The Symbol of Assurance
Fabrication Methods for Stainless Steel

• Common Methods
• Sheetmetal
  • Cutting, Forming, Welding, Grinding & Polishing
• Bars, Plates and Shapes
  • Sawing, Machining, Grinding and Polishing
• Finishing
  • Deburring
  • Grinding and Polishing
  • Passivation
  • Electropolishing
Cutting
Sheet metal

• Shearing
• Punching
• Plasma – Arc Cutting
• Laser Cutting
Machining

• CNC
  • Lathes
  • Mills
  • Grinding
  • Routers
• Automated
• Good for low cost radii
• Integrate Shapes
Finishing

- Grinding
- Polishing
- Electropolishing
- Passivation
Finishing Methods

Grinding and Polishing Tools

Weld Cleaning
Chemical Treatments

• Electro polishing
• Passivation
• Pickling
## Welding Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Features</th>
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<tbody>
<tr>
<td>GTAW (TIG)</td>
<td>Slower&lt;br&gt;Added Filler Metal</td>
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<tr>
<td>GMAW (MIG)</td>
<td>Wire Feed&lt;br&gt;Fast and Large Bead&lt;br HARDer to Polish</td>
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Welding Tubing

Manual
• Flexible Process
• Lower Investment

Orbital
• Uniform Process
• Setup Critical
• Precision Parts and Fit
Cost Saving Ideas

• Reduce or Eliminate Welding and Grinding
• Understand Product Contact Surfaces and Non–Product Contact Surfaces
• Avoid Corner Welds and Corner Polishing
• Stripe Finish
• Choose best welding method
• Laser Machine Optimimum Shapes
Stripe Finishing
Weld Finishes

WF-1 “As Welded”

WF-7 “Ground Flush”

WF-4 “Free Hand Buff”

WF-4 “Stripe Buff”

“Taped Stripe”

“Taped Stripe”
Which is easier to fit and weld?
Which is easier to Grind and Polish?
Need Stiffness and Not Full Corner Choose B
Welding and Polishing Required in Corner if in Product Contact Zone
No Corner Welding or Polishing Required
Gusset Design Options
(avoid tight corner welds)
Reduce Welding with Scalped Cut out
Welding of Scalped Cutout
Design to avoid corner weld and finish
CNC Laser and Arc Plasma Cutting

• Group parts to maximize material usage
• Reduces Setup Costs
Cutout Special Shapes
Precision Work with Laser Machine
Setup on a Stainless Steel Fabrication Shop and Maintenance Shop

• Best Practices
  • Stainless Only Shop – No Carbon Steel
  • Dedicated Tools for Stainless Steel
  • Isolate Material Storage
  • Separate Work areas and ventilation systems
Stainless Steel Laminated Work Benches
Material Storage

- Separate storage rack for 304 and 316 and others
- Marking method and codes
- Testing method available
Worktables, Pressbrake and lifting devices

• Laminate carbon steel worktables with SS
• Cover moving carts and temporary storage with to prevent iron contamination – SS, plastic, rubber wood
Separate hands tools for cutting, grinding and polishing

• Have two sets of tools in two isolated areas.
• Store in separate areas.
• Change saws, drills, cutting tools, abrasives and buffing pads if contaminated
Training employees in special handling methods

• Use dedicated tool
• Change abrasives
• Set-up welding procedures
• Certify Welders to AWS or ASME standards
• Training and refresh staff to procedures
If you cannot have separate Shop for Stainless and Carbon Steel

• Set-up a Management Plan
• Train to Plan
• An example to a dual materials shop.
Quality Procedures

RED for Mild Steel Parts
BLUE for Stainless Parts
Quality Matters!
Stainless Steel Parts on Blue Carts

(Blue paint wood plywood on steel carts)
Carbon Steel Steel Parts on Blue Carts
Dedicate Vibration Finishing Tanks

Red Carbon Steel

Blue Stainless Steel
Separate and Isolate SS from CS

Stainless Steel on SS Rack

Carbon Steel on CS Rack
Rubber Protector for steel dies on Press brake
Stainless Steel Bed on Laser Cutter
Summary

• Choose best manufacturing methods for application
• Review Design to reduce or eliminate welding
• Set-up a Stainless Steel Management Procedure
• Train Staff to Procedure
Questions

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