Hygienic Design & Fabrication Considerations and Techniques

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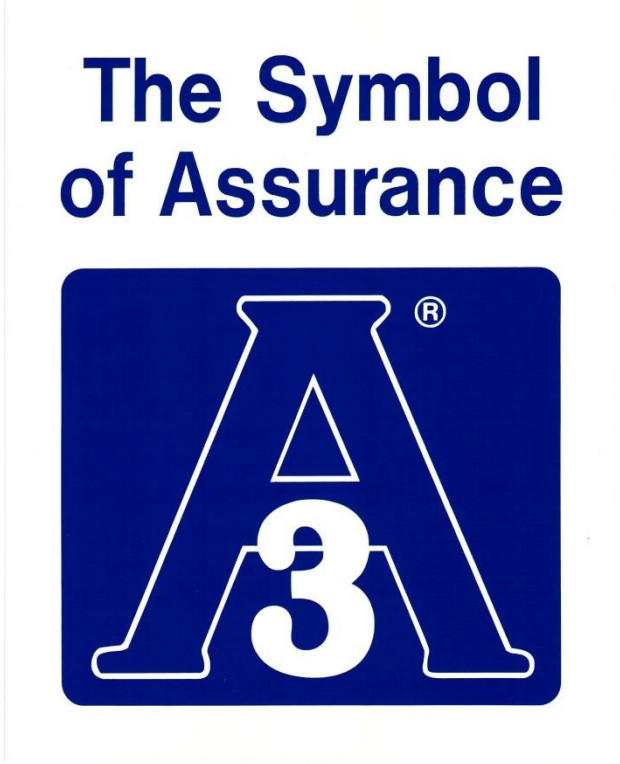


Fabrication Methods for Stainless Steel

- 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

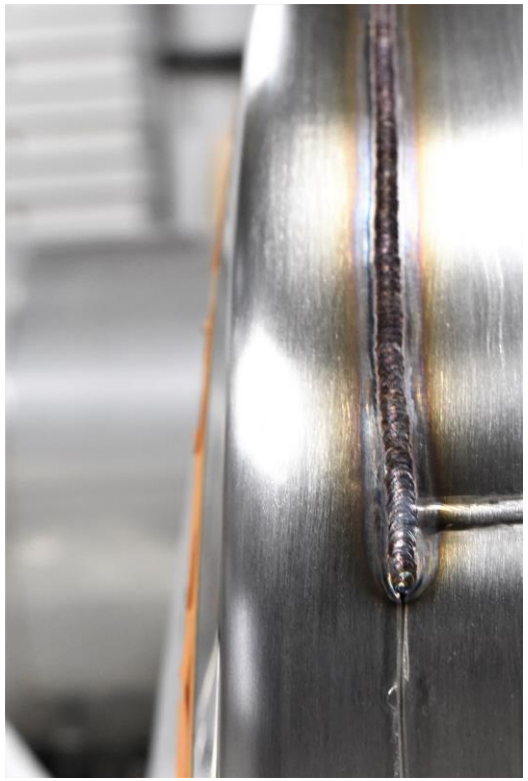
Chemical Treatments

- Electro polishing
- Passivation
- Pickling

Welding Methods

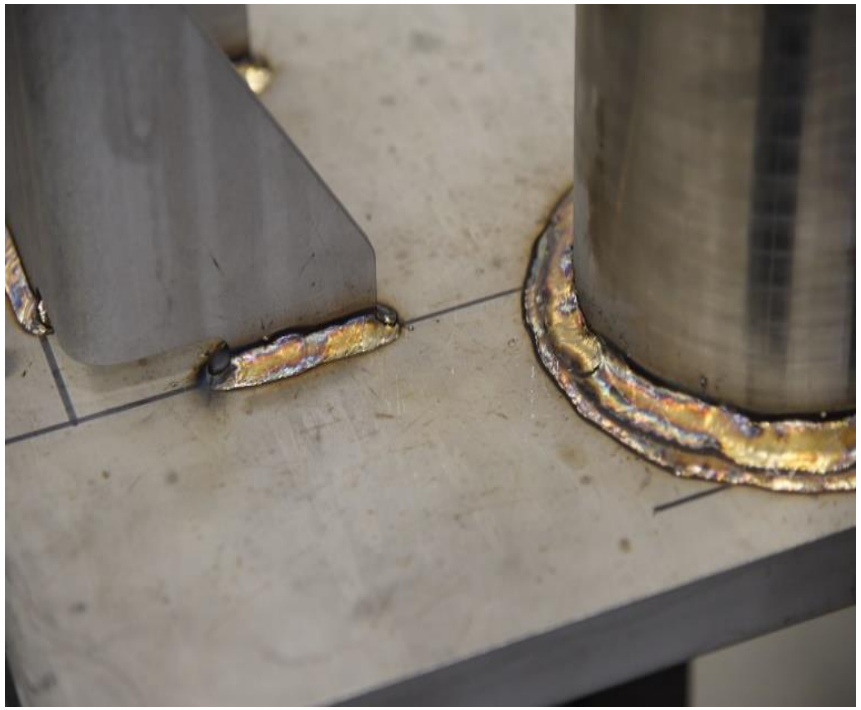
GTAW (TIG)

- **Slower**
- **Added Filler Metal**



GMAW (MIG)

- **Wire Feed**
- **Fast and Large Bead**
- **Harder to Polish**



Welding Tubing

Manual

- **Flexible Process**
- **Lower Investment**

Orbital

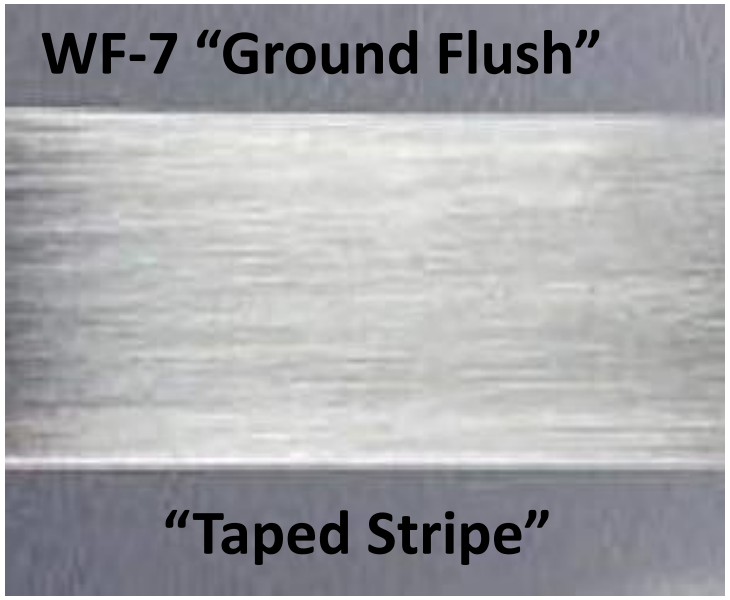
- **Uniform Process**
- **Setup Critical**
- **Precision Parts and Fit**

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

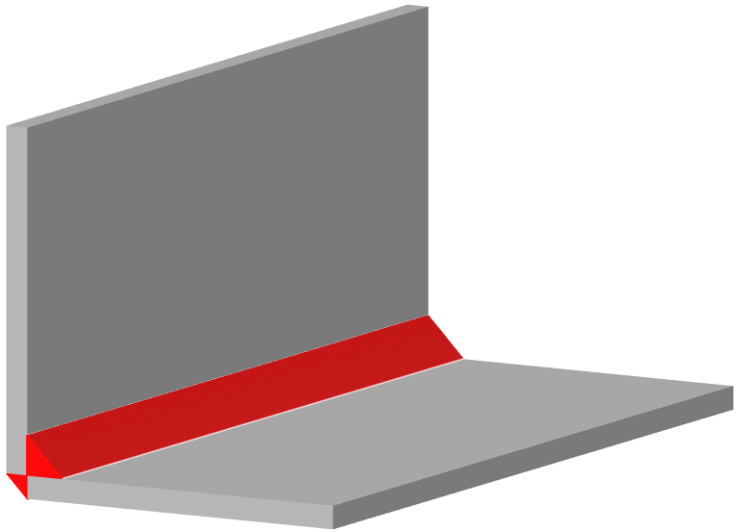
Weld Finishes



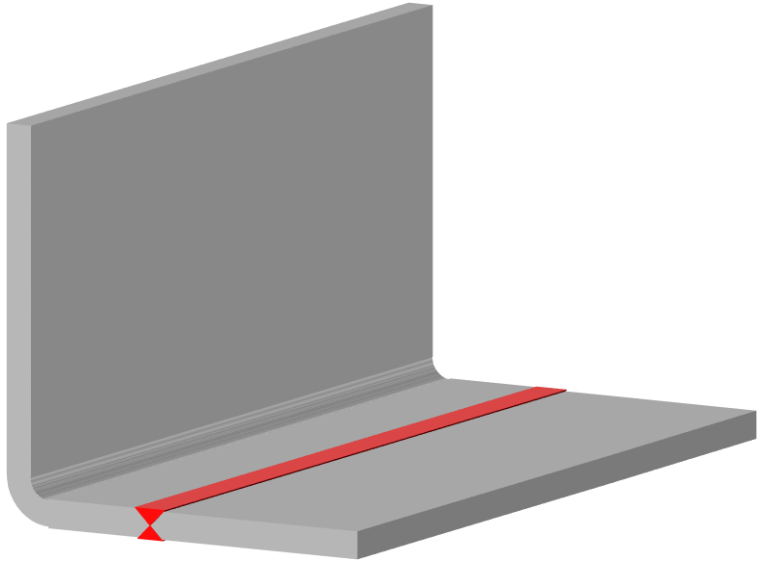
WF-4 “Stripe Buff”

“Taped Stripe”

Which is easier to fit and weld?
Which is easier to Grind and Polish?

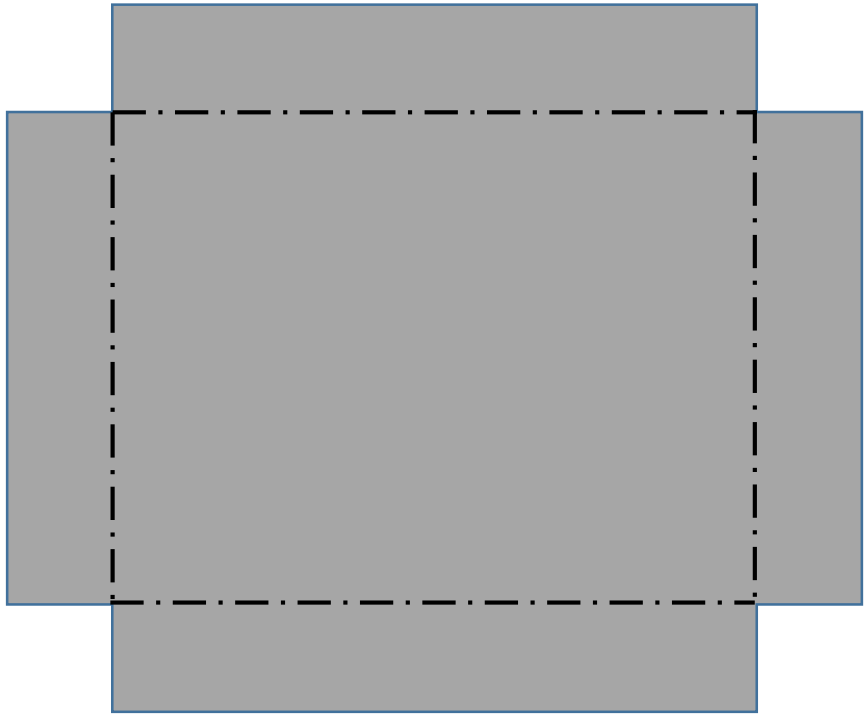


A



B

Need Stiffness and Not Full Corner Choose B



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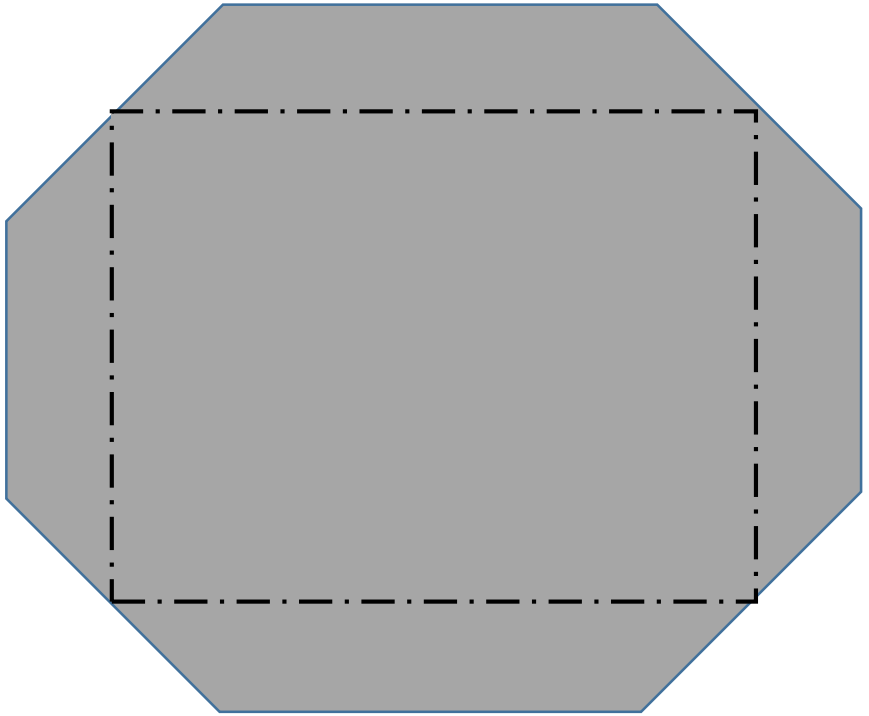
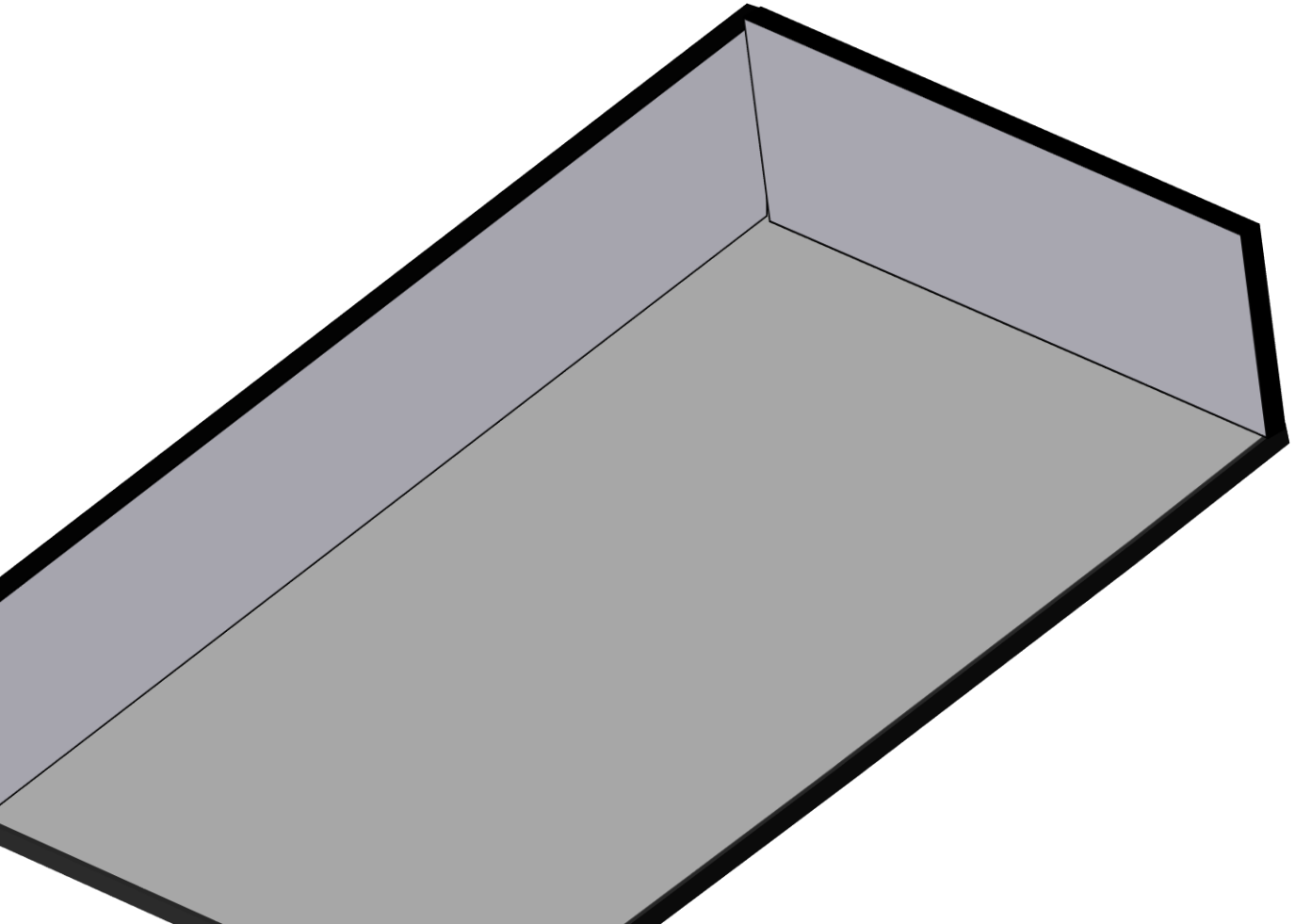
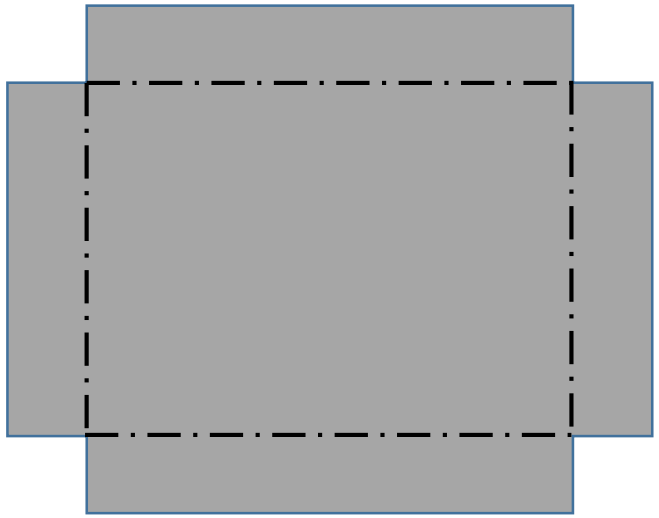


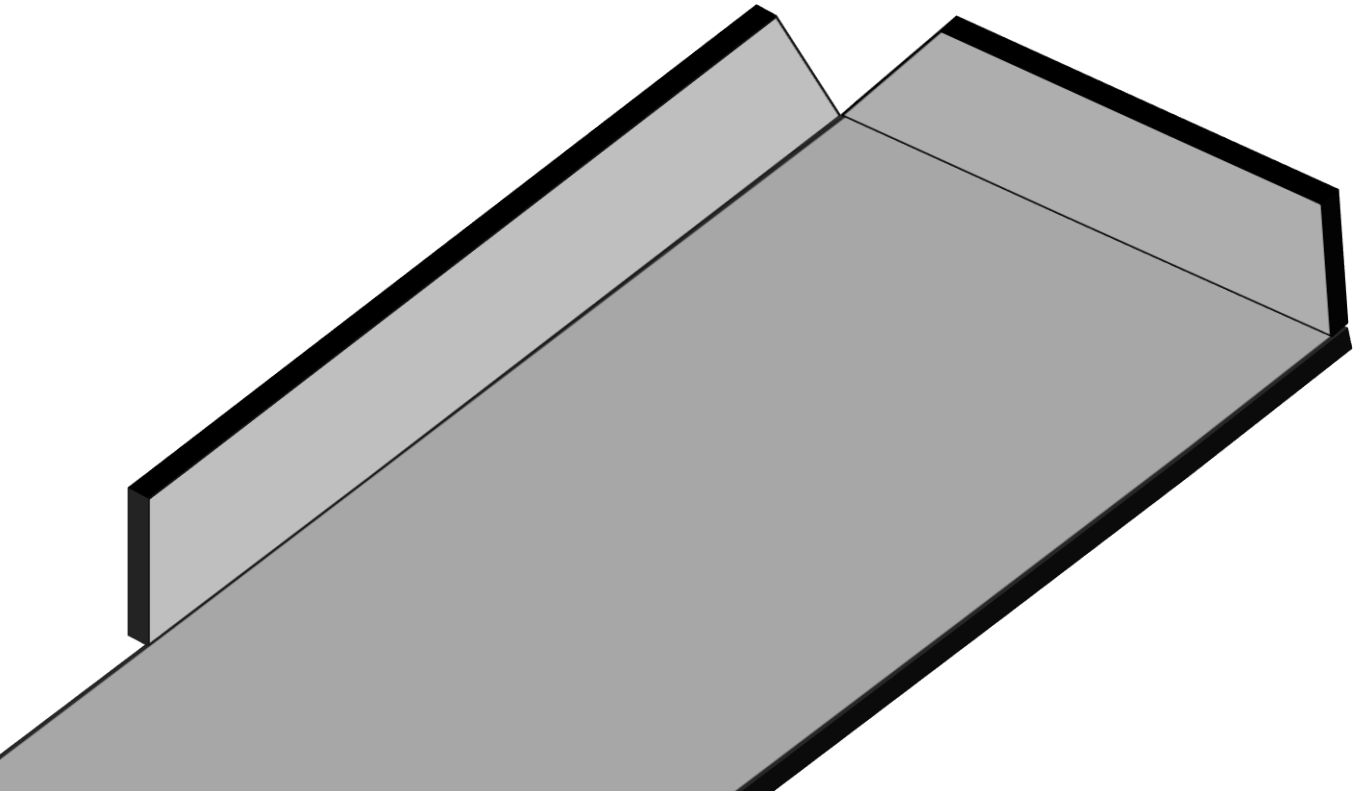
B

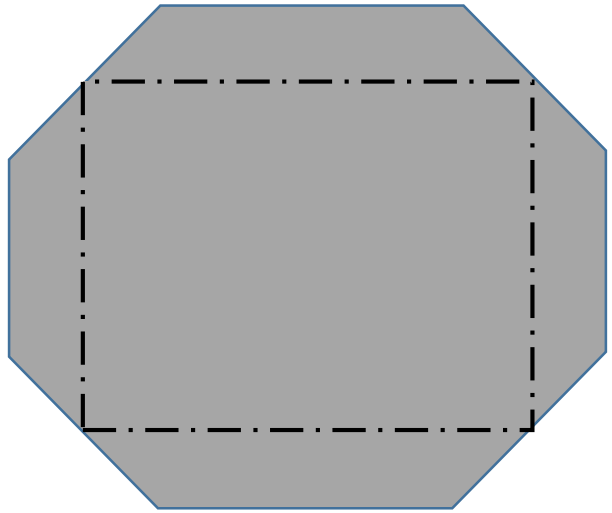
Welding and Polishing Required in Corner if in Product Contact Zone



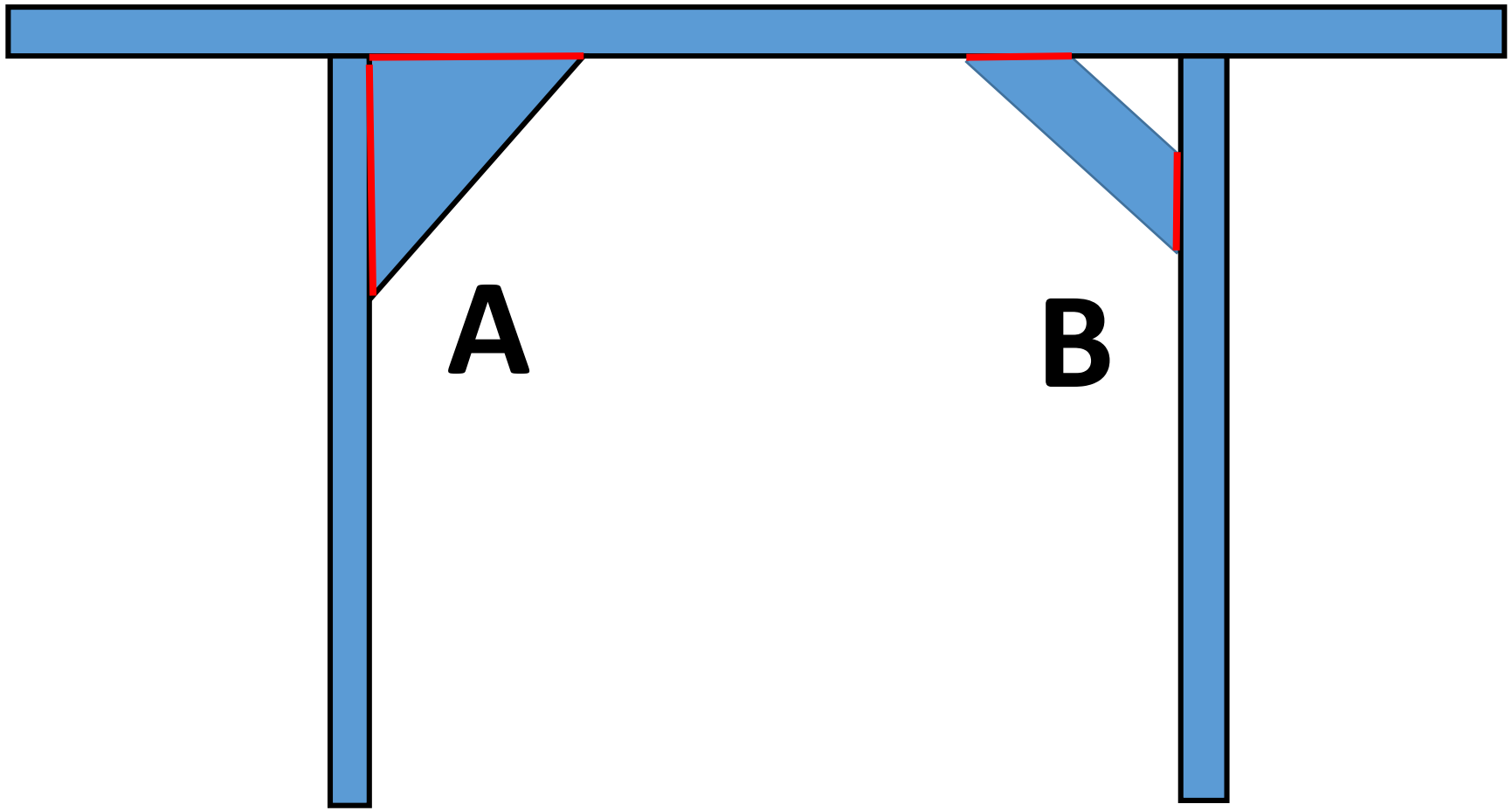


No Corner Welding or Polishing Required

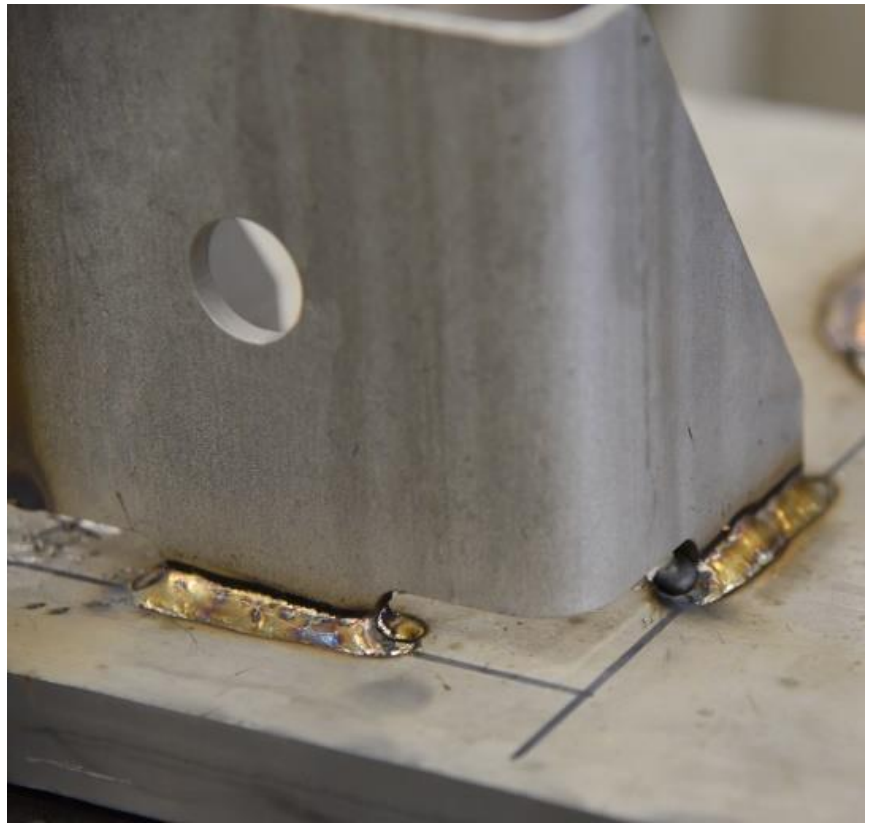




Gusset Design Options
(avoid tight corner welds)

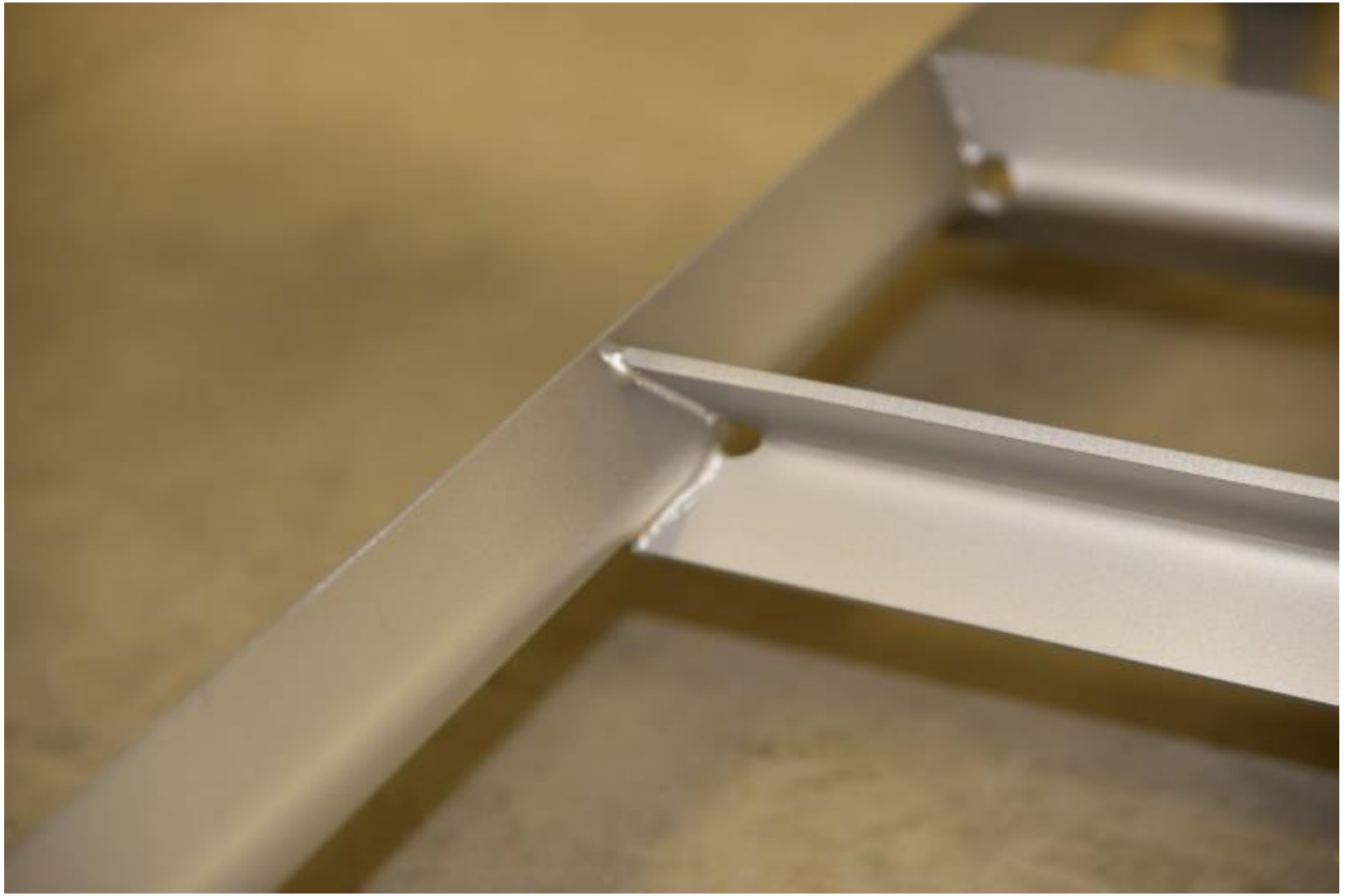


Reduce Welding with Scalped Cut out



Welding of Scalped Cutout

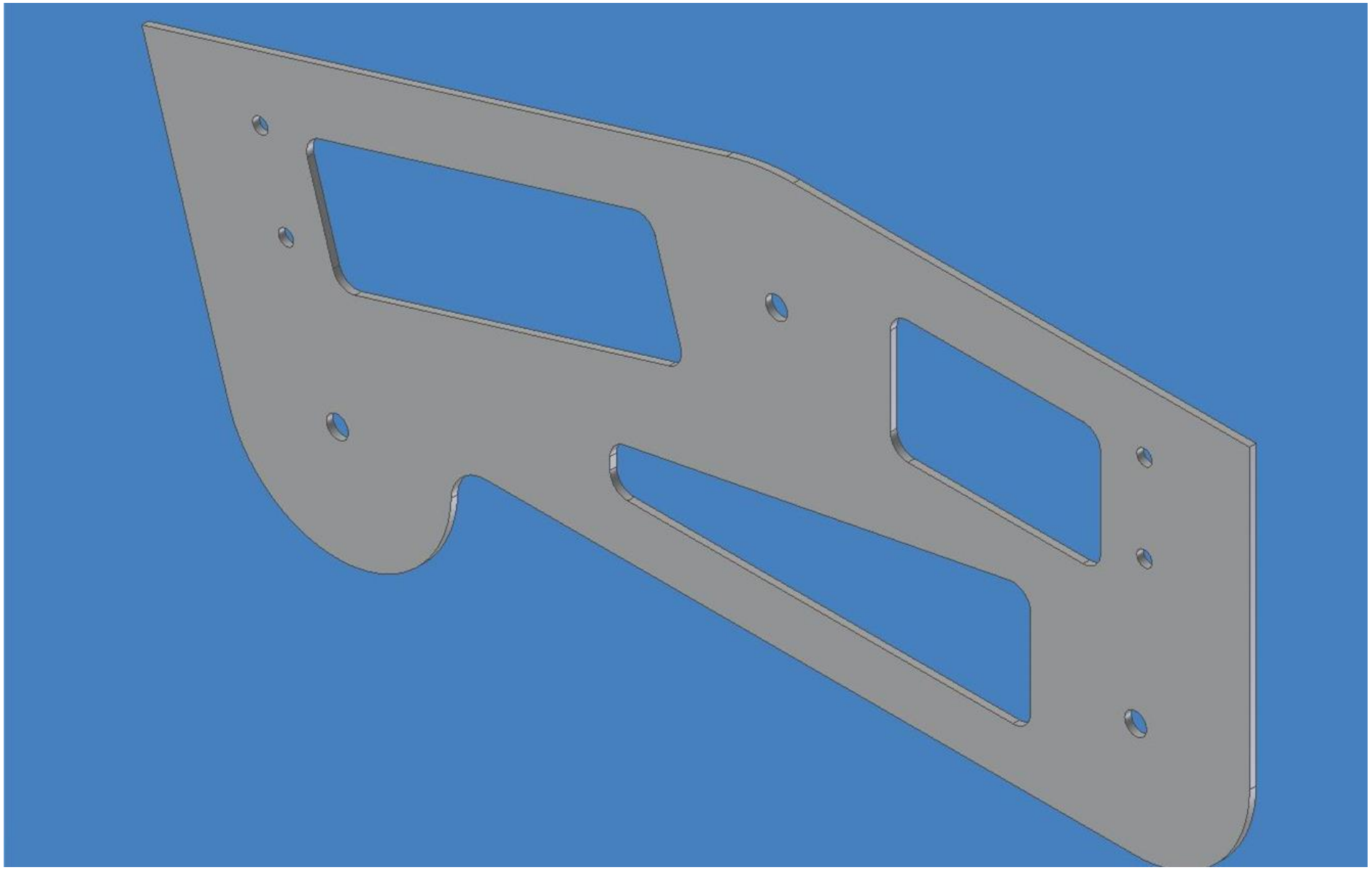
Design to avoid corner weld and finish



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


RUST

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

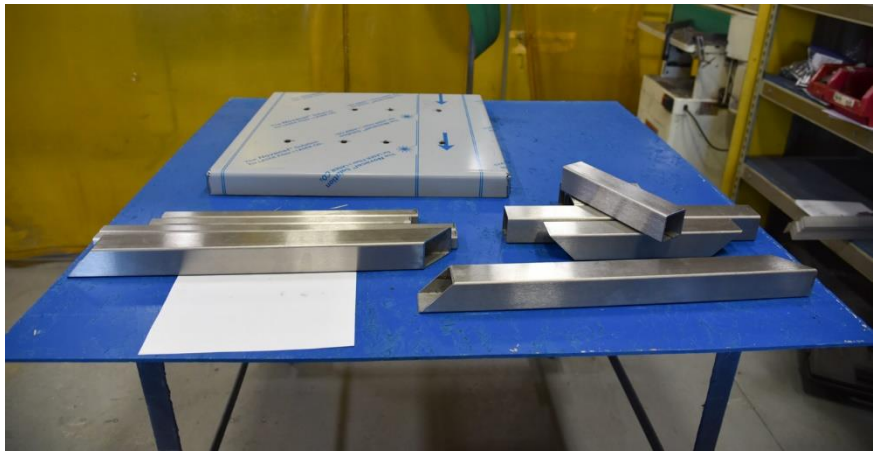
If you cannot have separate Shop for Stainless and Carbon Steel

- Set-up a Management Plan
- Train to Plan
- An example to a dual materals shop.

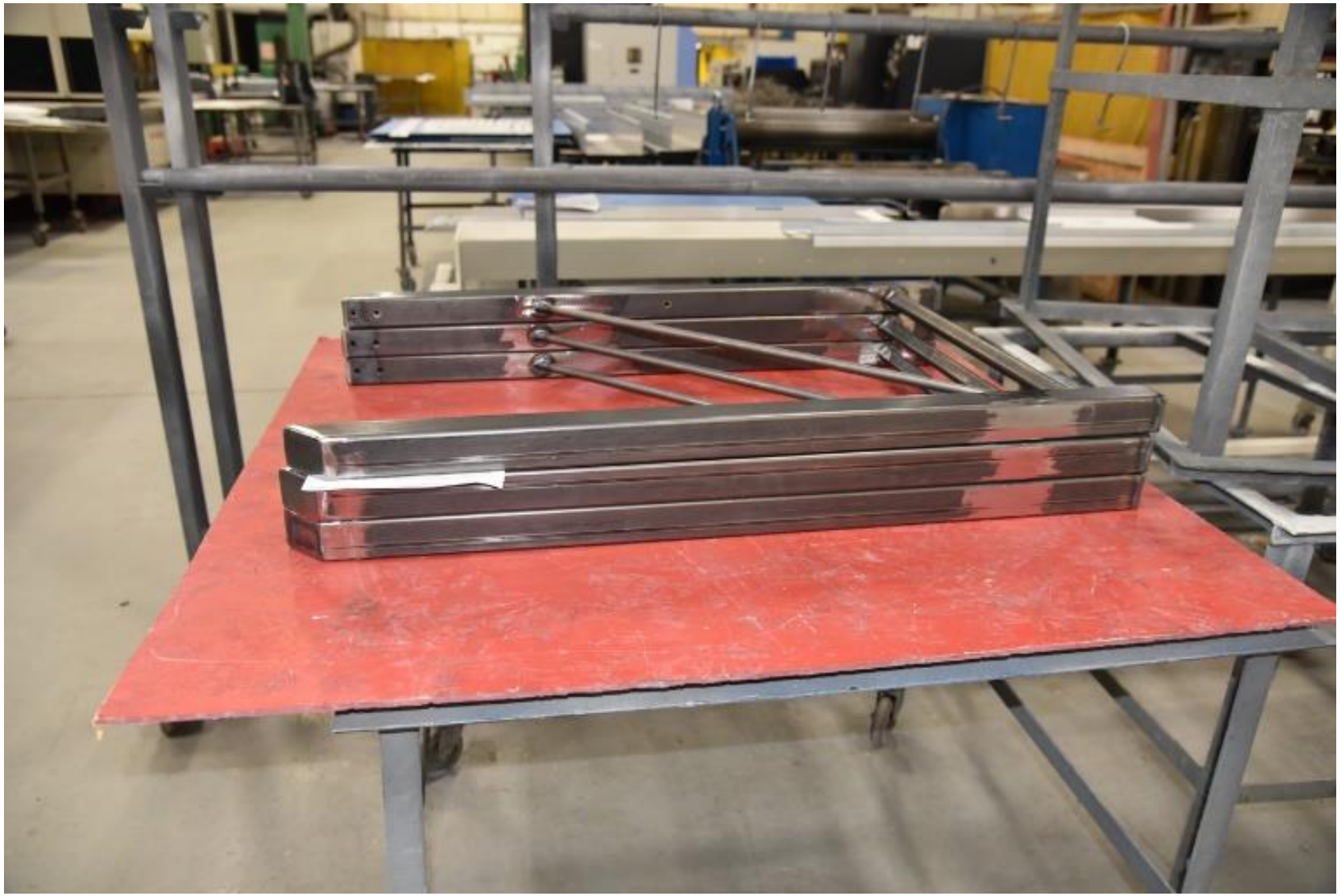
Quality Procedures

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 an 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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