



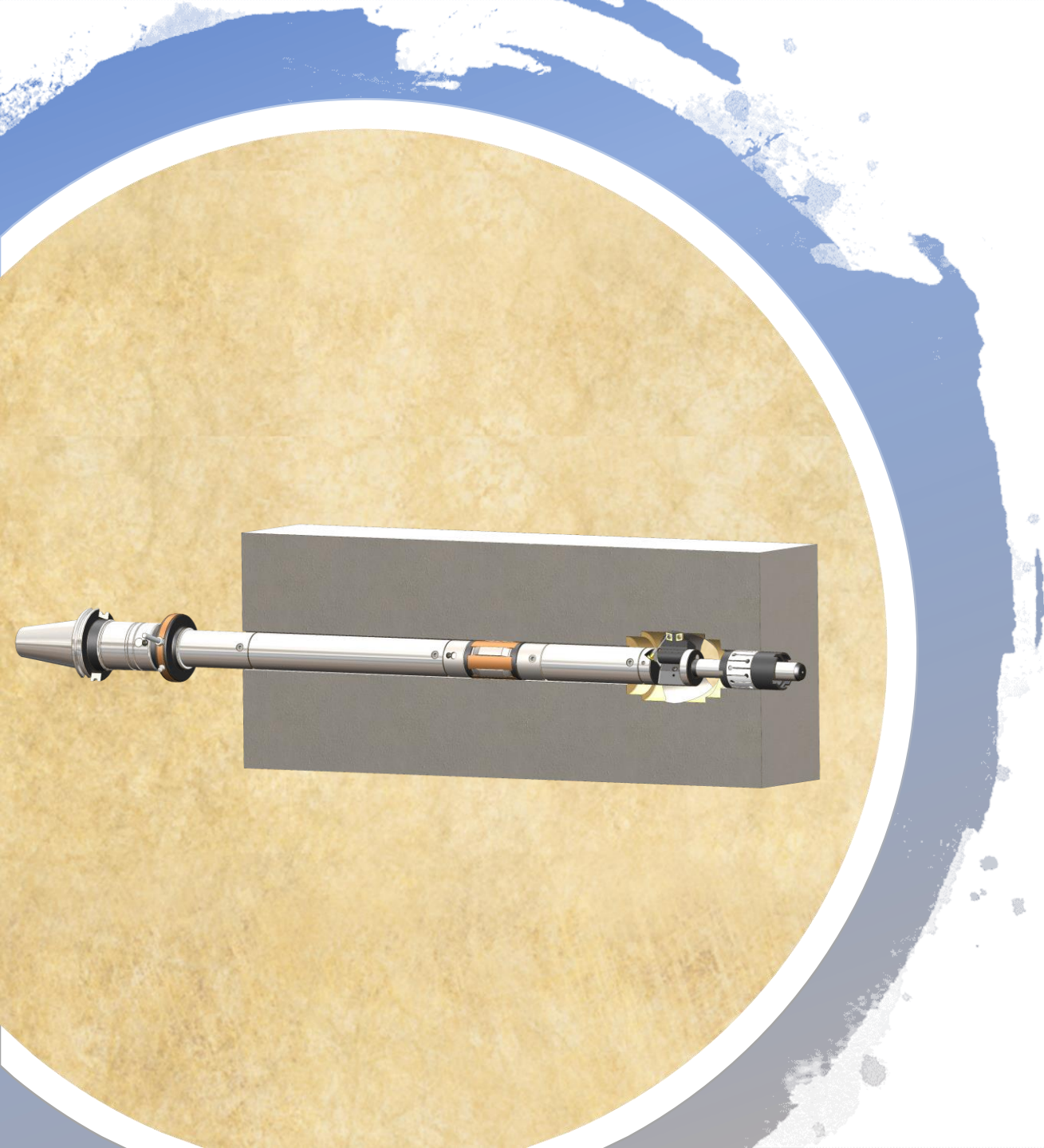
Machining of Seat Pockets and Clearance Bores
on Subsea Gate Valves

Steiner KA Series Autofacer

Steiner KA Series Autofacer

- We work with subsea gate valve manufacturers to significantly reduce machining times and streamline operations within their Gate Valve manufacturing processes





Different Ways To Machine Gate Valves

Machining on Vertical Turning Lathe

- Utilizing a VTL to machine these valves can be very cumbersome and often involves 3 or more setups to machine all required features
- The customer will need to purchase multiple sizes of offset boring bars to reach out to the required seat pocket and clearance bore diameters
- The unsupported tooling typically requires slower speed and feeds
- This will usually result in a rougher surface finish



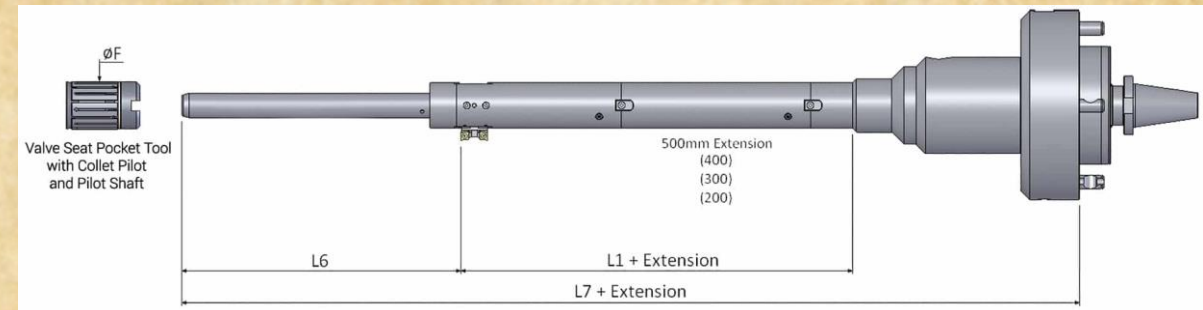
Machining on a Large Horizontal Lathe

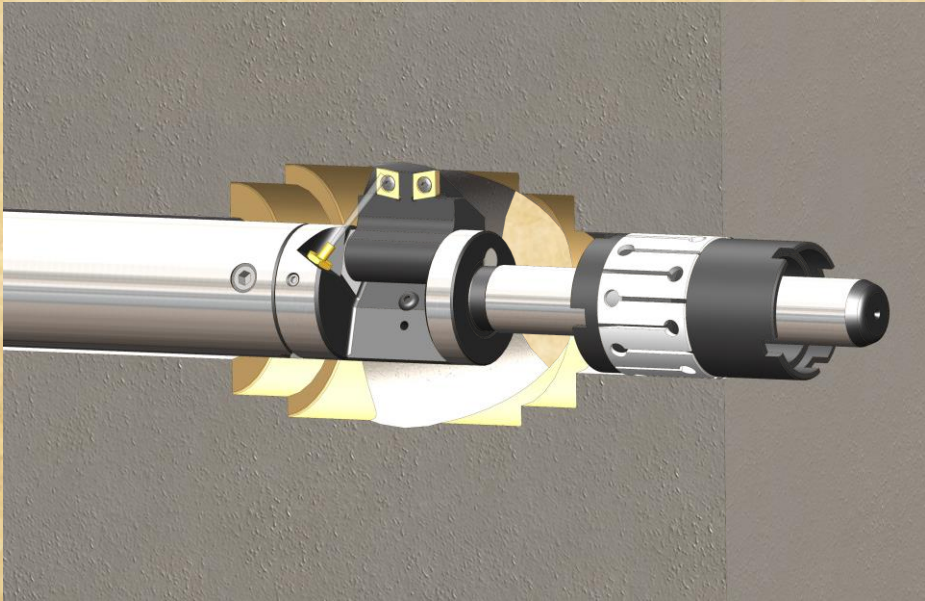
- This manufacturing process is very similar to running on a VTL
- The customer has the option to invest in an indexing chuck which allows for the possibility of machining all the internal features in one setup. However, these are very expensive and still have the negative effects of being unsupported.



Horizontal Boring Mill with Contouring Head Only

- Install expandable bushing in flow bore
- Use contouring head to rough in steel seat pockets and clearance bores (Up to 5.5 hour cycle time)
- Send valve out for Inconel weld
- Finish machine Inconel cladding with contouring head (Up to 11 hour cycle time)

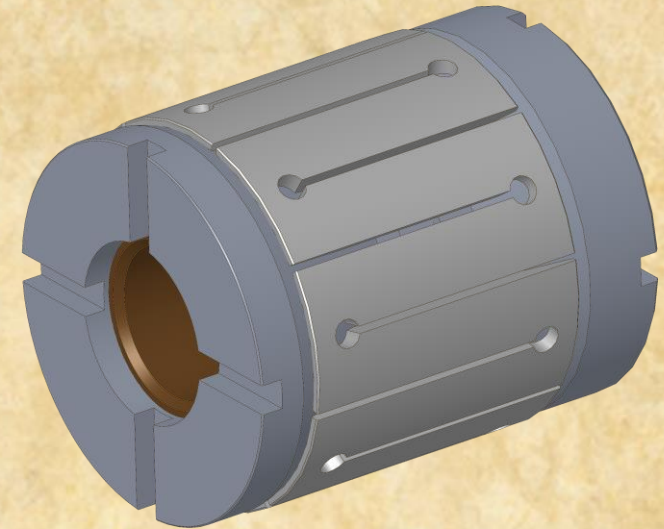




The Optimized Steiner KA-Autofacer Manufacturing Process

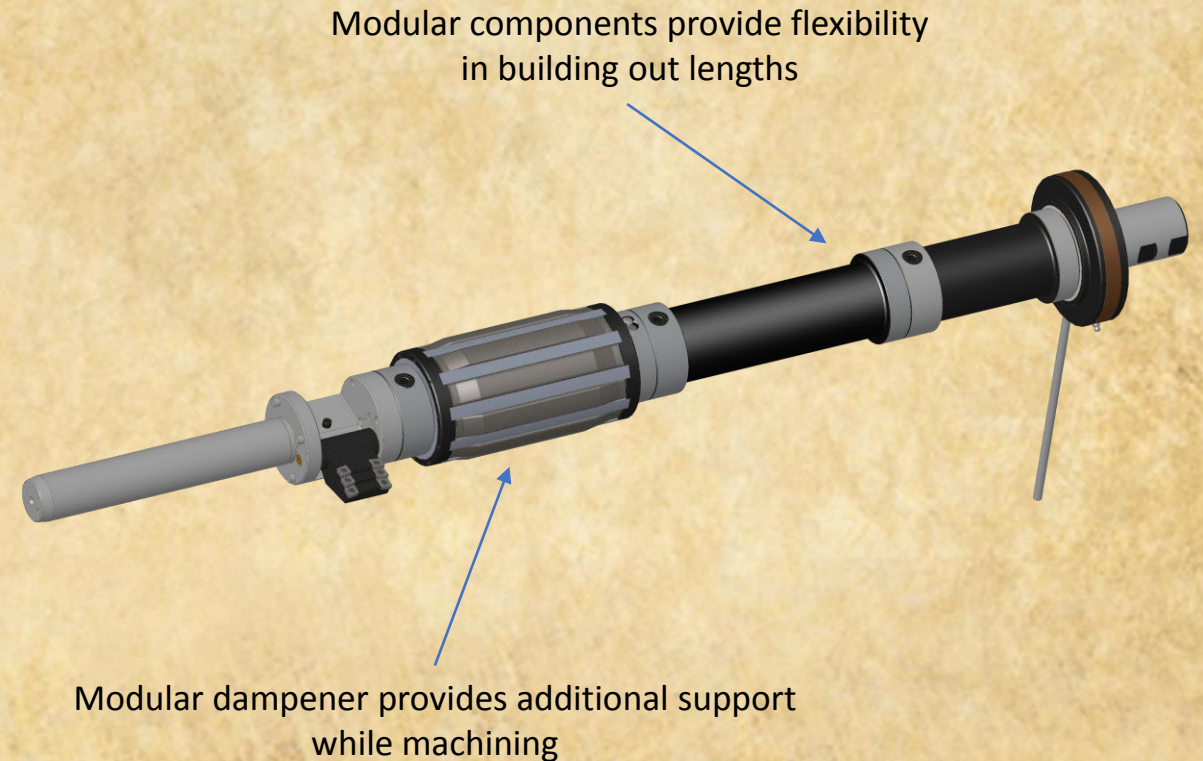
Install Expandable Bushing into Flow Bore

- The expandable bushing will provide support for the tooling while cutting
- We can design custom expandable bushings or utilize the customer's current expandable bushings used with contouring head
- Bushings utilize a bronze ID for a bearing surface
- A bushing installation tool will be offered along with the expandable bushing



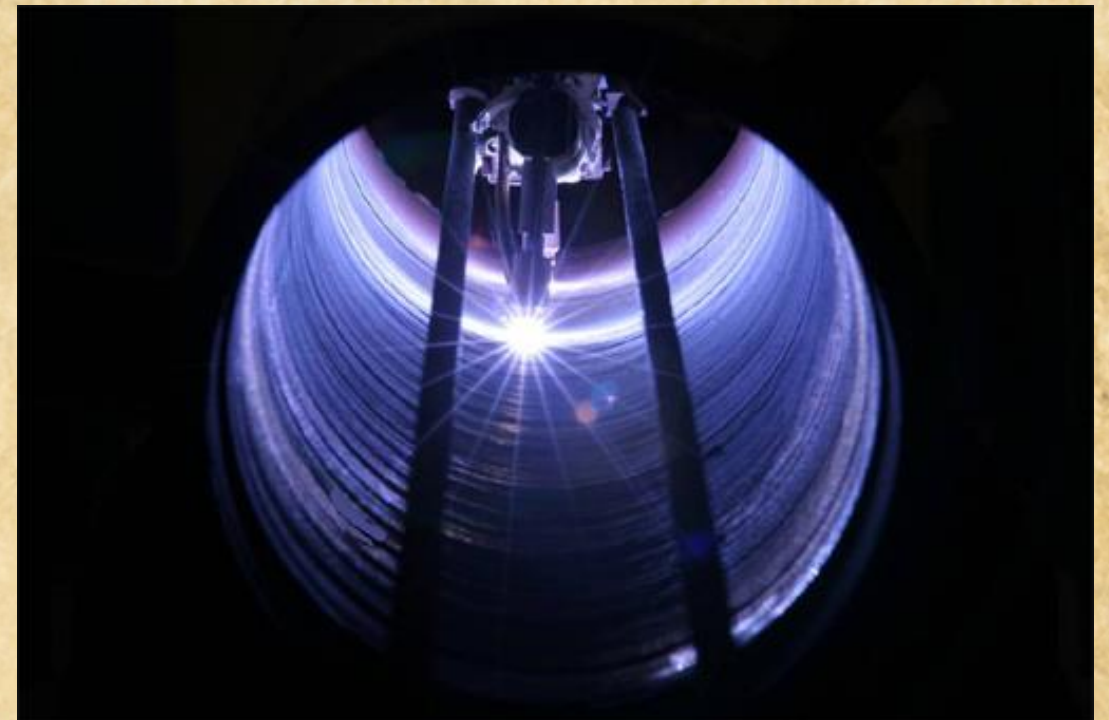
Run KA-Autofacer to Machine Seat Pockets in Steel

- Custom Master Holders will be designed to machine the seat pockets. Depending on clearances in the valve cross bore, we can provide push and pull cut inserts on a single Master Holder or on separate Master Holders
- If the part design deems it necessary, we will then install a new Master Holder in the tool to cut clearance bore diameters to size in the same fashion as the seat pockets (~ 35 minutes for both seat pockets and clearance bores)



Inconel Weld Machined Features

- Some Gate Valves deem it necessary to inlay Inconel weld the machined features for corrosion resistance when the valve is being used in the field
- The Inconel clad features will then need to be re-machined
- The most difficult problems this causes are:
The Inconel tends to be hard to machine, the cuts are heavily interrupted and there tends to be weld variation



Run KA-Autofacer on Inconel Clad Seat Pockets

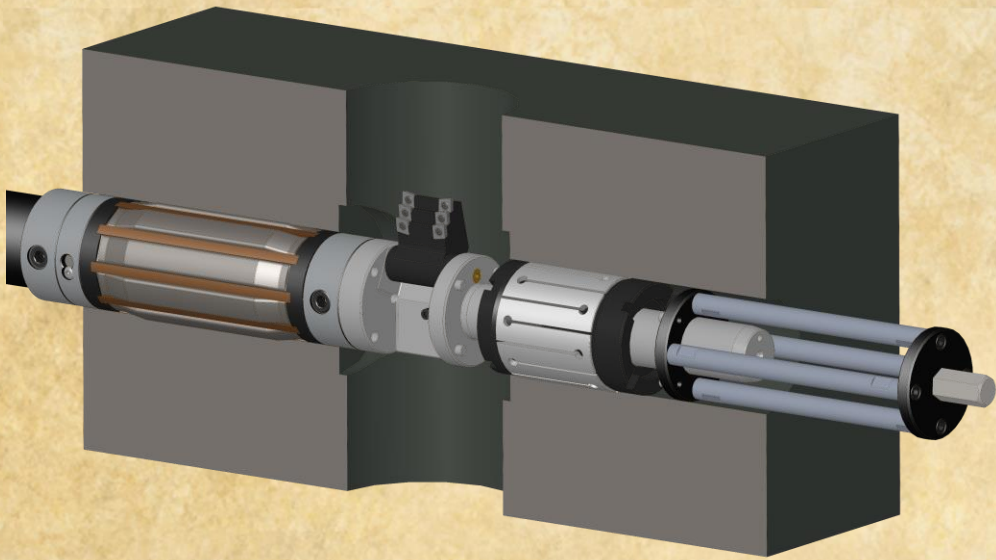
- Once the Gate Valves come back from weld, the manufacturer will set the valve back up on their Horizontal Mill
- The customer will run the same process to machine the Inconel clad seat pocket and clearance bore features to their rough dimension
- We will leave roughly .050"[1.3mm]/side for a finish pass (~ 1 hour)



Run Contouring Head to Finish Seat Pockets to Diameter

- A lot of Gate Valves require tight diameter and surface finish callouts that are difficult to achieve without single point machining
- Customer will install contouring head and take finish cuts (~ 5 hours)
- We will minimize air passes because we have roughed Inconel weld to a known diameter
- Because of known start diameters, customers will minimize risk of tool crash





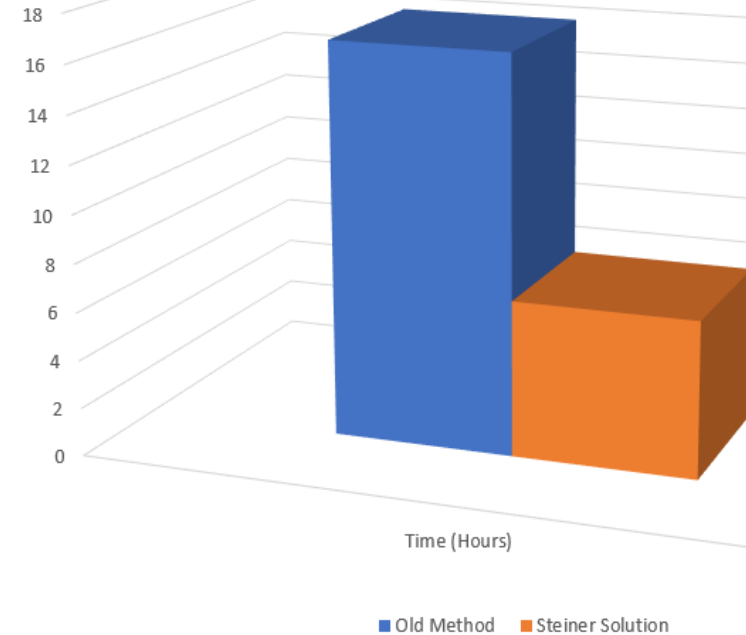
Realized Time/Cost
Savings

Cycle Times

- Old Method= 16.5 hours
- Steiner Solution= 6.5 hours
- Total Cycle Time Savings/Part= 10 hours
- **60% Reduction in cycle time**

Example Cost Savings

- \$100/hr machine rate x 10 hours/part=
\$1,000 cost savings per part





Technical Benefits

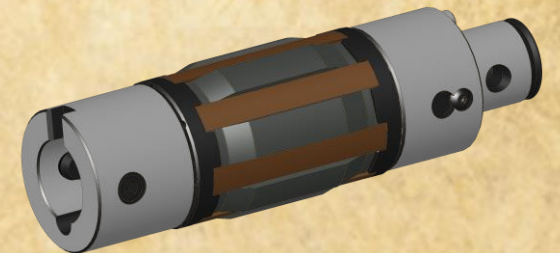
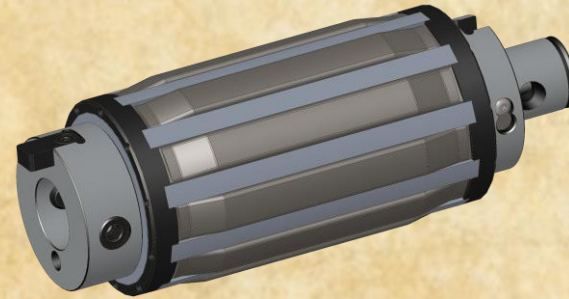
Technical Benefits

- Weld variation does not affect the manufacturing process
- Utilize same bushings as current contouring heads
- Rough in one pass
- Much stronger design
- More stable process
- W-axis machine is not necessary for running KA Autofacer
- Significantly less expensive than contouring heads
- Does not require machine to have W-axis



Modularity

- Utilizes high precision boring connections to be able to build out lengths to suit part needs
- Modular components are standard
- Standard tool sizes from $\varnothing 2''$ - $\varnothing 7''$ valves
- Spring loaded dampener reduces vibration in tool body when cutting



STEINER

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