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At PFI Precision Machining, manufacturing close-tolerance stainless steel components is one of our core strengths. Through our years of continued focus on process improvements and lean manufacturing techniques, we have developed an exceptional understanding of all of the factors that influence the quality, productivity, and consistency of machining stainless steel in all of its various grades and tempers.

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Precision Managing: A Case Study

INCONEL EXPERTISE YIELDS HIGHER QUALITY AND FASTER DELIVERY FOR AEROSPACE CUSTOMER

Inconel®, a nickel-chromium based super alloy, is becoming more and more in demand due to its durability and the ever-growing need for precision required in today's high-temperature, corrosive applications unique to aerospace, chemical processing and seawater applications.

Resistant to corrosion and oxidation and with the ability to withstand high temperatures, Inconel® sounds great, but it can be a headache for design engineers and machine shop engineers. Many machining companies try and fail, incurring great expense to master this superiorly tough metal. Not only does it quickly diminish tool life and require low tooling speeds, it is also prone to work hardening during the machining process which requires careful consideration when selecting tooling and machining parameters. Managing production speeds with end-product quality is a balancing act that we have perfected.

To address the issue of work hardening with Inconel®, our engineers spent a considerable amount of time refining techniques using numerous tooling combinations which considered different geometries, grades, coatings and machining parameters. Maximizing tool life while ensuring product quality requires focus when working with Inconel®. Longer tool life equates to lower cost and greater throughput for our customers. PFI continues to run tool tests daily to hone the process and reduce cost.

A government customer had an immediate need for a large volume of Inconel® 625. Sourcing this particular size ($\frac{3}{8}$ ") is particularly difficult in high quantities because it is a slow mover from a supply standpoint. Through a series of trials, our team determined that maintaining an inventory of Inconel® was essential, thereby resolving the two major barriers to short lead times for this material: proximity and material availability. With stocked, pre-tested and pre-approved Inconel®, PFI is responsive to short customer lead times and quick turnaround. Where most machining companies could wait up to 24 weeks to get raw material in, PFI can start production as soon as an order is received.

Not only do we use strict aerospace requirements for production and traceability, our team conducts a 100% surface finish requirement test and 100% size verification at the machine. Parts are inspected using a sampling system. If any feature on a part in a sample is bad, then all the parts are examined. The difference between us and most of the other shops is that we are driven to unparalleled quality and continuous improvement to ensure customers that their machined parts are to specification and on time. When inspecting a part for quality, we at PFI like to use the phrase, "Try to fail the part, not just pass it." Our reputation for quality was built on this philosophy.

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Project Name & Description	Precision-machined Inconel® shaft with short lead-time
Capabilities Applied/Processes	Turning
Equipment Used to Manufacture Part	CNC Lathe
Overall Part Dimensions	Diameter- 3/16" to 3/8" Lengths- 1.0"
Tightest Tolerances	0.001"
Material Used	Inconel 625
Material Finish	16 RMA Max
Industry for Use	Aerospace
In Process Testing/Inspection Performed	Shadow Gauge Profilometer
Volume/Year	20,000
Delivery/Turnaround Time	3-4 Weeks
Raw Inventory On-hand	\$23K
File Formats	AutoCAD (DWG, DWZ) PDF STEP