precitech

Global Manufacturer of Innovative Ultra Precision Machining Solutions

THE FAST TOOL SERVO

FTS 5000

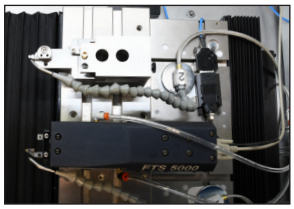
With the FTS 5000 Precitech is once again defining the state of the art of ultra-precision machining. It addresses the emerging needs of many new markets, including Head-up-displays (HUD) and Virtual Reality (VR).

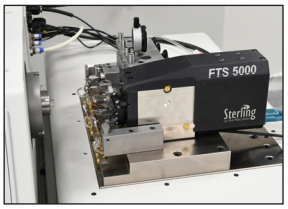
Five millimeters of travel and an unprecedented peak acceleration of 40 g's are a combination unmatched in the industry. This translates into significantly faster production of higher-complexity parts.

At the same time the FTS 5000 tractor fits in a compact package the size of a standard tool holder, saving machine space. It integrates seamlessly with current Precitech machining centers.

Precitech has more Fast Tool Servo (FTS) systems in use worldwide than any other supplier. Over the last 20 years Precitech has delivered over 500 FTS systems.

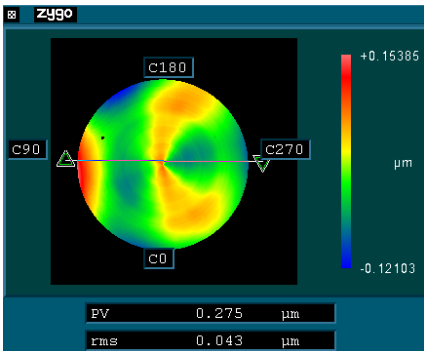
FTS systems provide a rapid method to fabricate freeform surfaces including: light management micro-structures, toric optics, and mechanical features in contact lenses, lens arrays and laser collimators. FTS cutting is typically 10-15 times faster than other servo tool cutting methods (e.g. XZC machining).

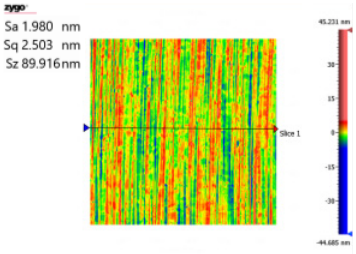




Left: *Footprint comparison between FTS 5000 and a standard tool holder*
Right: *FTS 5000 on a Sterling Optoform 80 ultra-precision ophthalmic lathe*

- ***Make the world's best FTS parts with the FTS 5000's unprecedented surface finish and form accuracy results***
- ***Make parts 3x faster than competitive products with unprecedented peak acceleration of 40 g's***
- ***Save valuable tool space with compact footprint (equal to a standard tool holder)***
- ***Expand your product portfolio with 5 mm of travel***
- ***Ease of use enabled by seamless integration with the machine controller via the FastCom III controller***





Example cutting results on a 5 mm tilted flat @ 2000 RPM

Left: *Form accuracy < 0.3 µm P-V measured on a Zygo Verifire™*
Right: *Surface finish at edge < 2 nm Sa measured on a Zygo ZeGage™*

Key Specifications

Guaranteed performance on our standard test part (ø48 mm tilted flat with 5 mm excursion)	Surface roughness < 4 nm Sa Form accuracy < 0.4 µm P-V (80 nm RMS)
Peak acceleration Continuous acceleration	400 m/s² (40 g's) 250 m/s² (25 g's)
Travel	5 mm
Typical acceleration	2000 µm @ 100 Hz 1000 µm @ 140 Hz 250 µm @ 280 Hz 100 µm @ 440 Hz

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ULTRA PRECISION TECHNOLOGIES

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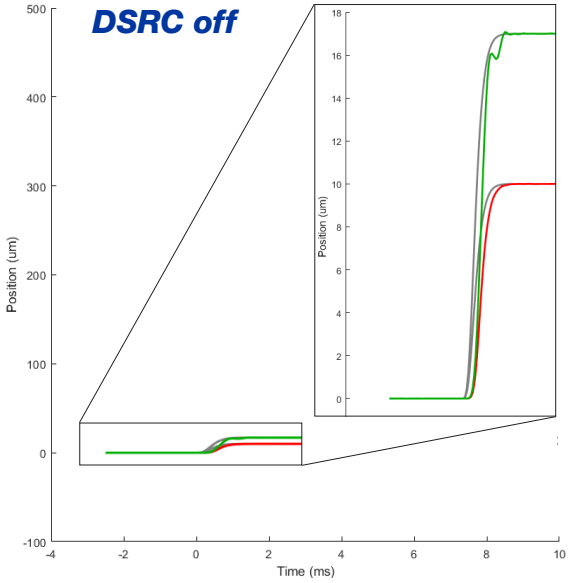
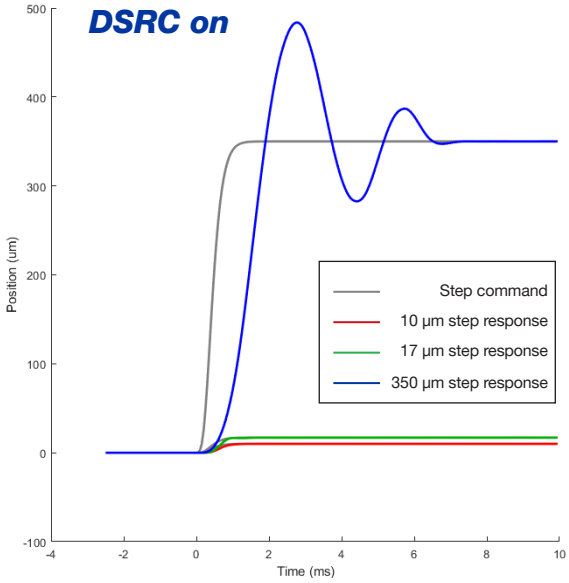
Dynamic Step Response Control (DSRC)

Traditional fast tool servos will become unstable and fault at command steps greater than 20 µm. Exclusively available on the FTS 5000, DSRC increases the size of the allowable step command to up to 350 µm. It also drastically decreases response time to a step change in velocity, which is common in lens array applications.



Position in response to a 10 and 17 µm step change with DSRC off. Note the rapid (~0.2 ms) settling time for the 10 µm step and the onsetting of instability at the 17 µm step.



Position in response to a 10, 17, and 350 µm step change with DSRC on. Note the elimination of the 17 µm step instability and the stable response for the 350 µm step.

Servo-controlled Tool Positioning Device (STPD)	Description
Travel	5 mm
Typical operational sinusoidal acceleration	2000 µm @ 100 Hz 1000 µm @ 140 Hz 250 µm @ 280 Hz 100 µm @ 440 Hz
Servo bandwidth	> 1 kHz
Drive system	Voice coil driven air bearing
Position feedback system	Glass scale
Tool holding capacity	Dual 6.35 mm | 0.25 in. square shanks
Tool height adjustment (integral to tool nose)	Coarse: ± 2.92 mm | 0.115 in. Fine: ± 0.38 mm | 0.015 in.
Fault protection	Protected against current limit, travel limit, and low air pressure faults
Facility requirements	
Electrical power supply	208/230 VAC, 50/60 Hz, 2 A
Air supply pressure	5.4 - 6.8 bar | 80 - 100 psi
Air consumption	38 l/min. | 1.4 SCFM
Tractor weight without tool	6.45 kg | 14.2 lbs.
Tractor dimensions without tool (LxWxH)	244.0 x 66.7 x 112.4 mm | 9.61 x 2.63 x 4.42 in.
Floor footprint of electronics cabinet (LxW)	610 x 914 mm | 24 x 36 in.

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