

Titanium Frame machining with Millstar High Feed Tool

Objective

The actual machining was conducted at a customer works to reduce the machining time of a Titanium Frame Component.

Process Chart for Roughing Operation

Tool Adapter	Collet Chuck
Tool Shank	CYF 16-160-16 (MILLSTAR)
Shank material	Steel
Overhang	70 mm
Insert	HF 16 –TLN (MILLSTAR)
Tool coating	Exalon™ (AlTiN)
Tool path Strategy	Z level machining
Depth of Cut	0.5 mm / pass
Step Over	11.20 mm
Stock remaining	0.15 mm
Feed	1500 mm/min
Spindle speed	3000 RPM
Millstar Machining time	480 minutes !!! (Can be reduced Further)
Previous Machining time	3600 minutes
Previous tool used	25mm - Trigon Insert Type High Feed Cutter
Reduction in Machining Time	3120 minutes!!! (85%)
Machine Used	Mikron WF 52D

View of the Component after completion of machining



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Machining Summary

The Titanium Forged Component (Ti6Al4V) was machined using Millstar insert type tool. The process earlier followed was to rough machine with a different make of High feed cutter with trigon insert design. The machining time was a whopping 60 hours and the actual on the machine time was 100 hours due to frequent insert indexing and vibrations which come into picture while machining Titanium.

The challenge before us was to fully machine the component in minimum possible time and to have a stable machining process with minimum vibrations and minimum interruptions while cutting.

The final component was machined from a forged Ti6Al4V material. The approximate size of the forging is **240 mm X 140 mm X 110 mm**.

Machine used was Mikron WF 52D CNC Milling machine with a working RPM of 5,000 RPM.



Picture of the Raw Forging before Machining

The tool was chosen to rough machine was the new introduction from Millstar, a diameter 16mm High Feed Tool (Single insert type design). The aim was to rough machine the job in minimum time using high speed machining techniques and with minimum stoppages so as to facilitate uninterrupted machining but at the same time achieving accuracies required even at roughing stage.

Depth of cut used was 0.5mm, stepover of 11.2mm, RPM of 3000 and feedrate of 1500mm / min !!! . These parameters are unheard of in uninterrupted machining of Titanium. The cutting speed was more than 150 meters / min. The roughing process was completed in 480 Mins which was a record time for a component of this size when the previous machining time before Millstar took over was about 60 hours and on machine time of about 100 hours. With Millstar at work the insert life was as predicted which resulted in very few interruptions for insert indexing and the machining could be executed as planned on CAM station.

All this was possible only due to high performance tool coating and the new High feed geometry from Millstar coupled with the rock solid V Seating design which has always performed in an exceptional manner.

At Millstar, we just don't sell cutting tools, we deliver the latest in cutting technology !!!