HSMcil

The Productivity Enhancer

MILLSTAR

Cutting Edge Solutions

Titanium Blade test cut

Objective

The demo was conducted to demonstrate the high-speed, high volume and heat resistant super alloy machining capabilities of Millstar insert type and Moldstar solid carbide cutting tools

Machining Summary

The Titanium Alloy blade was machined using a 3D NC program to demonstrate the high-speed, high volume and tough to machine material machining capabilities of Millstar insert type and Moldstar™ solid carbide cutting tools.

The size of the blade was 1 inch by 2 inch . The previous machining method was to rough machine using solid carbide tool with very low feedrates and utilizing lesser cutting speeds. The component was finished using a smaller diameter solid carbide tool and again with very small stepover and low feedrates. The total machining time was 180 mins.

HSMCIL machined the same component with two tools . One of Diameter 8 insert type ball nose of Millstar make and Diameter 4 mm Ballnose tool of Moldstar™ make. Total machining time was 45 Mins .

Machine used was a Feeler make vertical machining center equipped with Siemens 810D controller.

Process	Tool	RPM	Feedrate	Depth	M/c Time
Roughing	Dia 8 VRBS	7000 ^{min}	1500 mm ^{min}	0.8 mm/pass	15mins
Semi Finishing	Dia 4 Solid Carbide (Moldstar)	10000 ^{min}	1000 mm ^{min}	0.4 mm/pass	3 mins
Finishing	Dia 4 Solid Carbide (Moldstar)	10000 ^{min}	1400 mm ^{min}	0.0007mm - scallop	27 mins
			Total Machining Time		**45 Mins / Blade**

Previous Process	Tool	RPM	Feedrate	M/c Time
Roughing	Dia 8 Solid Carbide	2500^{min}	$800\ mm^{min}$	40 mins
Semi Finishing	Dia 3 Solid Carbide	3000^{min}	$500\ mm^{min}$	22 mins
Finishing	Dia 4 Solid Carbide	3000^{min}	$600\ mm^{min}$	118 mins
		Total Machining Time		**180 Mins / Blade**

Summary

Prior to this test the machining time for machining this component from roughing through finishing was around 3 hours .

HSMCIL conducted this test with the Millstar Ballnose type insert tool and Moldstar™ solid carbide Ballnose endmill which can cut at very high cutting parameters as demonstrated. **The complete machining operation from rough to finish was completed in 45 minutes**. **This reduced the machining time by 75 %.** The gain in machining time gives the customer an opportunity to use the machine to produce more components.

The surface finish achieved on the blade aerofoil area was excellent and the geometrical accuracy was better than the previous machining methods. This resulted in minimum manual polishing time and minimum rejection during inspection.

Using **Millstar** tools also resulted in more number of parts per tool as opposed to high consumption of cutting tools as is the norm in titanium alloy machining. The semi finishing and the finishing tool lasted to machine more than 5 components which is unheard of while machining titanium. These tools have used cutting speeds of upto $120\ m^{-min}$ which again is a rarity in titanium machining. This has been achieved by a very accurate cutting geometry made for high speed and high volume machining as well as the **Exalon™ (AlTiN)** coating which has excellent heat resistance properties as well as shock load resistance properties which plays a very important role in enhancing the tool life in titanium alloys.

This test cut unquestionably proves that using Millstar tools and technology results in enhancing productivity in aerospace components machining even while machining the heat resistant super alloys.

With today's competitive market forces at work can you afford not to have Millstar tooling and technology at work for you?