

Paper Phenolic component machining with Millstar tools

Objective

The machining was conducted to prove the superiority and higher economics of using Moldstar solid carbide cutting tools in composite material machining.



Machining Summary

Paper filled phenolic material component was machined using Moldstar (Millstar) Exalon coated solid carbide endmill to prove the high-speed, difficult to machine material machining capabilities of Moldstar solid carbide cutting tools.

The size of the Paper filled phenolic composite material block was 150 X 36 X 36.

The machine used was LMW Kodi 40 machine with 6000 RPM spindle and Fanuc **O i M** controller.

Process sheet for machining

Process	Tool	RPM	Feed	Machining Time
Roughing 1 st setting	Dia 10 Solid carbide bullnose endmill (Moldstar)	5000	1500mm ^{min}	16 Minutes
Finish 1 st setting	Dia 10 Solid carbide high helix endmill (Moldstar)	5000	1500mm ^{min}	
Finish – Slot 1 st setting	Dia 5 High helix endmill (Moldstar)	6000	800mm ^{min}	
Roughing and finishing of top slot 2 nd setting	Dia 10 High helix endmill (Moldstar)	5000	1500mm ^{min}	
Roughing and finishing of bottom slot 2 nd setting	Dia 5 High helix endmill (Moldstar)	6000	800mm ^{min}	
Total Machining Time	16 Mins			

Summary

Prior to this test the total milling time for this component was about 45 minutes in 2 settings using normal cutting tools and conventional machining methods.

HSMCIL conducted this test with Millstar make Moldstar high performance solid carbide endmill which can cut at very high cutting parameters even in the tough to machine composite material which has an abrasive effect on the cutting tool.

The component was completely machined in 16 minutes from the raw block stage. This reduced the machining time by almost 1/3 from the previous machining time. There was also the problem of the component developing cracks in the earlier process and tools because of the blunting of cutting edges before 20 components were machined. This led to a very high rate of rejection. **The usage of Moldstar solid carbide tools resulted in NIL rejection rate even after cutting 160 components with the same set of tools.**

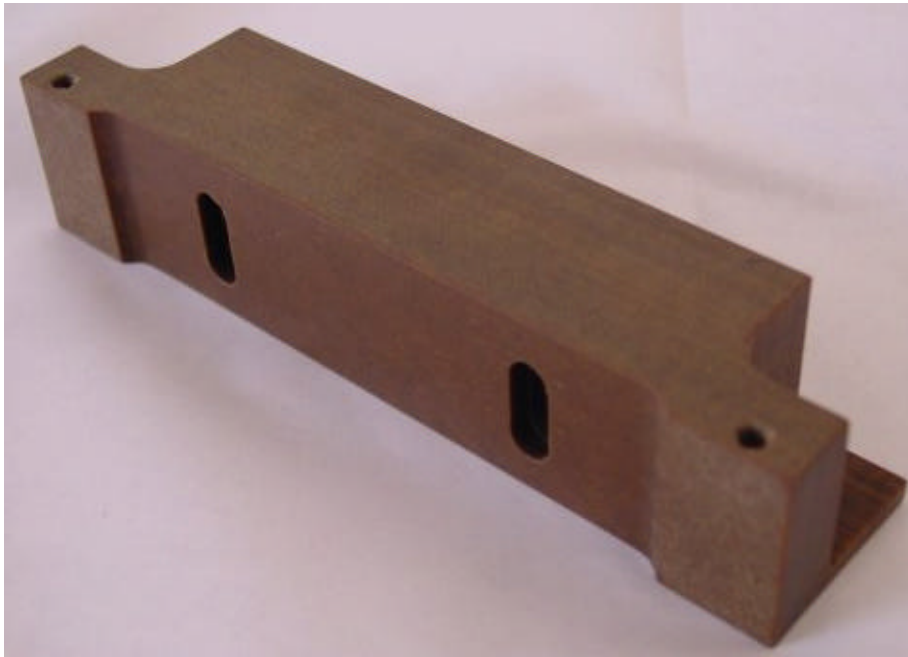
The finish achieved and the accuracies on the component were excellent owing to the superior geometric accuracies on Millstar tools and the **Exalon™ (AlTiN)** coating.

The reduction machining time gives the customer an opportunity to use the machine to produce more components and the NIL rejection rate gives provide for him better economics since there is no scrapped component.

Observations

There was very little blunting of the cutting edge at the end of the cut on all the tools used which gives the customer the opportunity to cut more number of components per cutting tool. This brings down the actual tooling cost incurred per component. The reduction of

machining time results in lower machining time. **Customer now produces as much as 3 components in the same time in which earlier he machined 1 component.**



The superior geometry on the Moldstar high helix endmill and the superior Exalon™ (AlTiN) coating resulted in very less wear on the cutting edges.

Using Millstar tools also resulted in uninterrupted cutting operation due to NIL rejection rate as well as NIL tool change due to cutting tool wear.

Using Moldstar solid carbide tools resulted in reduced cycle times owing to increased chip loads per tooth and higher life of the tools result in lesser tooling cost per component. The high helix geometry on endmill applied in the right manner produced very high surface finish on the component in very less machining time.

This test cut proves that Millstar technology can be very well used on composite material machining and increase the level of productivity by a very big margin.

This test cut has again proved that using Millstar tools results in enhancing productivity by a huge margin with lesser cost per component. It also gives the customer more flexibility to use the machine to produce more number of components in the same available time.

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