

Forging die test cut with Millstar TO insert

Objective

The demo was conducted to demonstrate the high-speed, high volume and high hardness machining capabilities of Millstar insert type cutting tools.



Machining Summary

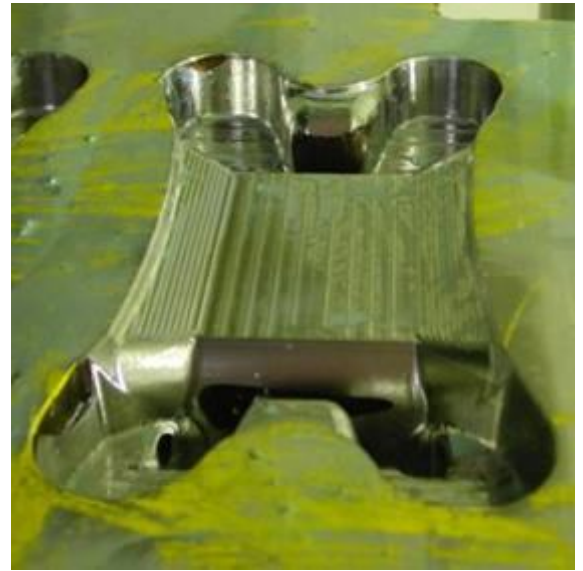
44 HRC Forging die cavity was machined using a 3D NC program to demonstrate the high-speed, high volume and high hardness machining capabilities of Millstar insert type cutting tools.

The size of the die is 160 X 290 X 60. The previous machining method was to rough machine using a round insert type twin insert tool (toroid type) and a solid carbide tool to reach bottom of the die with total machining time of **7 hours using 2 tools.**

HSMCIL conducted the same operation with one tool of Diameter 12 TO with corner radius of 3 mm. Total machining time for the roughing operation was 2 hours.

	Collet Chuck (MST)
Tool Adapter	
Tool Holder	CYF 12 - 150 - 12 (MILLSTAR)
Holder material	Steel
Neck diameter	D2=12 mm
Neck length	L1=42 mm
Insert, back draft	TO-12-N (R 3.0) MILLSTAR
Tool coating	Exalon™ (AlTiN)

Toolpath Strategy Z level machining
 Cutting Depth 0.6 mm / pass
 Stock remaining 0.1 mm
 Step Over 5 mm
 Feed 3200 mm/min
 Spindle speed 3200 RPM
 Machining time **120 minutes**



Competitor Process	Tool	RPM	Feedrate	Depth	M/c Time
Roughing (1st Step)	Dia 12TO R 3.5	2500 ^{min}	1000mm ^{min}	0.5 mm/pass	360 mins
Roughing (2nd Step)	Dia 10 Solid carbide	3800 ^{min}	760mm ^{min}	0.5 mm/pass	60 mins

Total Machining Time 420 Mins / Cavity

Summary

Prior to this test the machining time for roughing this part was around **7 hours** using **2 tools** one of which was a solid carbide which costs much more than an insert type tool.

HSMCIL conducted this test with the Millstar Toroid type tool which can cut at very high cutting parameters as demonstrated. **The operation was completed in 2 hours using a single tool. This reduced the machining time by more than 70% and the number of tools to one.** The cost of the tooling decreased by a significant amount compared to the previous operation. The gain in machining time gives the customer an opportunity to use the machine to produce more dies.

The stock left is only 0.1mm which will be precise all over owing to the superior geometrical accuracy of Millstar inserts. This will further contribute to the increase in life of the tools used in finishing operations due to the availability of constant stock which results in constant cutting load for the tool.

The stock left with the normal twin insert type design tools is not constant owing to the inferior design in terms of accuracy of the tool in assembled condition. The irregular wear on the insert also contributes to the irregular cutting loads. This also lessens the cutting life of the finishing tool because of the inconsistent cutting loads produced due to uneven stock.

Using Millstar tools also results in uninterrupted cutting operation due to less number of insert indexing per operation.

This test cut has again proved that using Millstar tools results in enhancing productivity with lesser cost per die.