

# Rubber Mold Cavity test cut with Millstar tools



## Objective

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

## Machining Summary

Rubber mold cavity was machined in EN 24 grade steel using a 3D NC program to demonstrate the high-speed, high volume capabilities of Millstar insert type and Moldstar solid carbide cutting tools .

The size of the die block was 240 X 140 X 56. The size of each impression was 98 X 78 X 56. The number of cavity impressions were 2 Nos .

The machine used was Makino KE55 milling machine with a 6000RPM spindle. Controller was Fanuc 21M series (Pro Jn). Communication mode used was RS 232C interface.

Tool Adapter	Collet Chuck
Tool Holder	<b>CYF 12 - 150 - 12 (MILLSTAR)</b>
Holder material	Steel
Neck diameter	D2=12 mm
Neck length	L1=42 mm
Insert, back draft	<b>TO-12-N (R 3.0) MILLSTAR</b>
Tool coating	<b>Exalon™ (AlTiN)</b>
Tool path Strategy	Z level machining
Cutting Depth	0.6 mm / pass
Stock remaining	0.15 mm
Step Over	5 mm
Feed	2000 mm/min
Spindle speed	3000 RPM
Machining time	<b>32 minutes</b>



**Rubber Mold Cavity after Roughing operation**

Tool Adapter	Collet Chuck	
Cutting Tool	<b>BM 6.0 EX (Moldstar)</b>	
Tool coating	<b>Exalon™ (AlTiN)</b>	
Tool path Strategy	Z level machining - Finishing	
Finishing scallop	2 microns	
Feed	1400 mm/min	
Spindle speed	6000 RPM	
Machining time	<b>180 minutes</b>	
		<b>Rubber Mold Cavity after Finishing operation</b>

### Process sheet

Process	Tool	RPM	Feed	Machining Time
Roughing	Dia 12 Toroid (Millstar)	3000	2000mm <sup>min</sup>	31 mins
Semifinish	Dia 6 Ballnose endmill (Moldstar)	6000	1200mm <sup>min</sup>	31 mins
Finish 1	Dia 6 Ballnose endmill (Moldstar)	6000	1400mm <sup>min</sup>	186 mins
Finish 2 (Bore finish)	Dia 12 Toroid (Millstar)	2500	750mm <sup>min</sup>	11 mins
Finish 3	Dia 4 Ballnose endmill (Moldstar)	6000	960mm <sup>min</sup>	21 mins
Finish 4	Dia 4 Square Endmill (Moldstar)	6000	1000mm <sup>min</sup>	11 mins

<b>Total Machining Time</b>	<b>301 Mins/ for 2 Impressions</b>
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### Summary

Prior to this test the machining time estimated for this cavity was around 16 hours for both impressions using normal cutting tools and conventional machining methods.

HSMCIL conducted this test with the Millstar Toroid type tool and Moldstar solid carbide endmills which can cut at very high cutting parameters as demonstrated. **The cavity block was completely machined in 5 hours. This reduced the machining time by more than 65% from the previously estimated time.** The finish achieved was 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 dies.

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 dies per cutting tool. This brings down the actual tooling cost incurred per die.

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

Using Moldstar solid carbide tools result in reduced cycle times owing to increased chip loads per tooth and higher life of the tools result in lesser tooling cost per die.

**This test cut proves that Millstar technology can also be used on relatively lower RPM machines and increase the level of productivity by leaps and bounds. Using the same technology on HSM capable machines will increase the productivity of the machine by a very large extent.**

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

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