MILLSTAR

Cutting Edge Solutions

42 HRC Meter cavity machining with Millstar tool

View of Dia 16 Ballnose Insert after Machining

Objective

The actual machining was conducted at a customer works to reduce the lead time of a molding cavity manufacturing time.

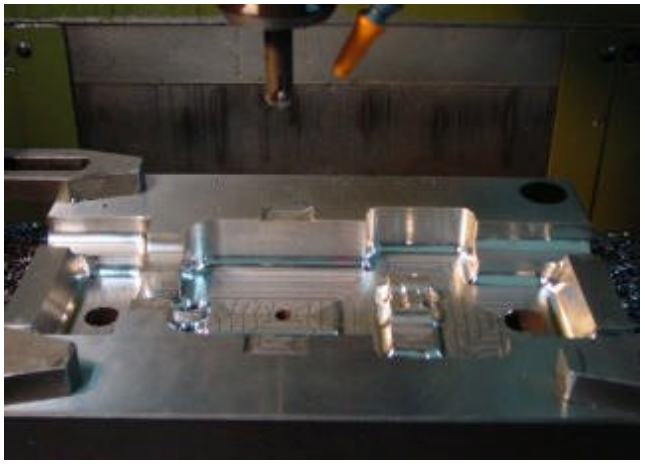
Machining Summary

42 HRC Meter cavity insert was machined using Millstar insert type tools and Moldstar solid carbide tools. The process earlier followed was to rough machine the cavity in soft state and spark the entire cavity as well as the moving core area after hardening.

The challenge before the customer was to fully machine the die in hardened condition and eliminate spark erosion process to a very large extent.

The cavity was machined from a solid block of **42 HRC** through hardened die steel block. The size of the cavity impression was **346 mm X 156 mm X 36 mm**.

Machine used was Makino KE 55 CNC Milling machine with 6000 RPM.



View of the Die after completion of rough machining

The tool was chosen was Diameter 16 ballnose endmill (insert type design) from Millstar. The aim was to rough machine the job in minimum time using high speed machining techniques and with one insert so as to facilitate uninterrupted machining.

Depth of cut used was 1mm, stepover of 7.2mm, RPM of 5000 and feedrate of 3000mm / min !!! The cutting speed was more than 250 meters / min. The roughing process was completed in 100 Mins which was a record time for an impression of such a big size. The insert lasted for the full cut ensuring the process security as well as uninterrupted machining.

Process Chart for Roughing Operation	
Tool Adapter	Collet Chuck
Tool Shank	**SFCY 16-160-16(MILLSTAR)**
Shank material	Steel
Neck diameter	D2=16 mm
Neck length	L1=50 mm
Insert, back draft	**RB 16 N FS TLN (MILLSTAR)**
Tool coating	**Exalon™ (AlTiN)**
Tool path Strategy	Z level machining
Cutting Depth	1.0 mm / pass
Stock remaining	0.15 mm
Feed	**3000 mm/min**
Spindle speed	**5000 RPM**
Machining time	**100 minutes!!!**

View of machining

Process Sheet

S No.	Process	Tool	Depth of Cut / Stepover	Actual machining time
1	Roughing 1	Dia 16 ballnose **(RB 16 R FS TLN)**	1mm / 7.8mm	100 mins
2	Semi finish 1	Dia 12 Toroid **(TO 12 TLN)**	0.6mm / 5mm	40 mins
3	Semi finish 2	Dia 8 ballnose **(BM 8.0 EX)**	0.48mm / 3.6mm	40 mins
4	Finish 1	Dia 8 ballnose **(BM 8.0 EX)**	0.001 scallop	240 mins
5	Finish 2	Dia 4 ballnose **(BM 4.0 EX)**	0.001 scallop	3 mins
6	Finish 3	Dia 10 High Helix Endmill **(EMS 10.0 EX)**	0.2mm / 4mm	91 mins

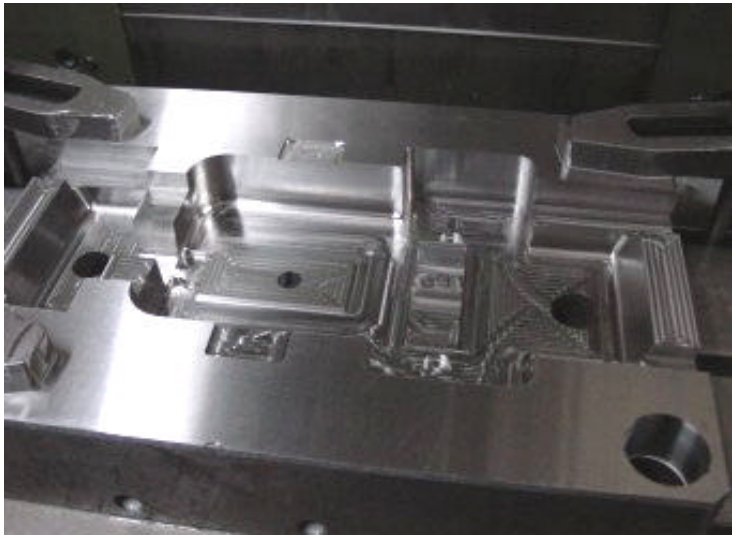
Total machining time

8 Hours 34 Mins

Summary

Prior to this cut the total machining time for this cavity was very high owing to a lot of spark erosion process involved and also the process of rough machining in soft using bigger diameter tools which used to create a lot of stresses in the cavity as well as add to the lead time. The previous roughing time alone was about 4 ½ hours by using a 32mm Bullnose round insert cutter after which the corner reduction machining would take up even more time due to uneven stock leftover by previous tool.

HSM*cil* conducted this cut with the **Millstar** Insert type tools and **Moldstar** solid carbide tools which can cut at very high cutting parameters as demonstrated. **The impression was rough machined in 100 minutes. This reduced the machining time by a very large extent from the previous machining time.** The stock leftover was uniform after roughing which ensures that the finish tool gets accurate stock for cutting owing to the superior geometric accuracies on **Millstar** tools and the **Exalon™ (AlTiN)** coating. The reduction in machining time gives the customer an opportunity to use the machine to produce more dies and reduces the cost of machining by a large margin.



View of fully machined Cavity

The even wear on the cutting edge at the end of the cut demonstrates the rigidity of the tool shank the superior insert design of Millstar tools as well as the run out control which is due to the unidirectional accuracy of Millstar tools. This brings down the actual tooling cost incurred per die. Using a higher RPM machine would cut the down even the finishing time by a large margin further reducing the total machining time.

Using Millstar tools also results in uninterrupted cutting operation due to less number of insert changes per operation. **In the above case the insert change was NIL.**

The full cavity area was machined along with the side core area and the integrated wedges for side core. This was a most comprehensive machining done for a cavity area which is a very practical way of machining a Cavity insert in real-time situation. Spark erosion was minimized to less than 5% of the total cavity machining area which is a big achievement for a Mold maker for cutting down lead time.

This cut proves that Millstar technology can improve productivity by leaps and bounds and fully implements the high-speed machining technology.

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

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