

CIM Precision Molds (HK) Ltd

CIM was the first mold shop in Hong Kong to convert to graphite in the early 1990's. The conversion process required not only a material switch, but also an upgrading of technology and training for the operators on how to use graphite.

Concerns about graphite dust were eliminated with the addition of high-speed graphite machining centers that controlled the machining dust. As copper machining operations were phased out, the number of CNC machining centers necessary to support the electrode needs of the EDM machines was reduced. One graphite-machining center could produce enough electrodes to support 5 EDM machines.

Other concerns were about graphite's ability to keep tight tolerance and produce a good surface finish, but, after using graphite for several months, this was no longer a concern to the operators. They did notice that the grade of graphite used for the electrode material had a significant effect on the success of the job. Initially, they used low-grade graphites that had high wear and required additional electrodes to complete the job. They experienced problems caused by the grain size and inconsistency of the microstructure of the graphite. Some cavities were scrapped due to uneven surface finish and pinholes caused by uneven electrode wear and large grains dropping out of the electrode. They quickly found that choosing the appropriate grade of graphite for the application significantly increased their productivity and the quality of their mold cavities. Even though they were spending more for high quality graphite, their cost machine the electrodes and the time to EDM the cavities was greatly reduced, making their jobs more profitable than when they used cheaper graphites. POCO's local applications engineer provided the technical support and training necessary to achieve optimum performance with graphite electrodes.

This job required 40 molds, each with 4 cavities, designed to run on small mold machines, and they needed short lead-time on the first mold - 7 weeks. CIM, a company known for solving problems, accepted this challenge. They successfully designed this 4-cavity mold to run on a 100-ton press rather than the usual 280 ton press and met the deadline. As a consumer product, the look and feel of the case was very important. To shorten the production time, they used an EDM finish rather than chemical texturing or sandblasting. They are very comfortable achieving a seamless EDM finish on jobs that require multiple shaped electrodes to produce a cavity. The quality of the electrode material is key in order to achieve these results.

Plastic Surface Finish Gauge

POCO developed a series of plastic EDM surface finish gauges to help mold makers and their customers select the desired EDM finish. There are 16 sample EDM finishes per side. Each finish was created using standard machine settings that the operator can replicate on their machine.

These gauges were developed in cooperation with individual machine tool manufacturers that cut the cavities using their programmed machine settings to obtain the selected surface finishes. Two grades of graphite were used to produce cavities - one side was cut using EDM-3, an Ultrafine grade, and the other side was burned using EDM-200, a Superfine grade.

The POCO gauge is unique in that it demonstrates how the graphite grade and the program settings work together to create unique and repeatable EDM finishes. Because appearance is very important in consumer products, the production challenge is to translate the design specifications into the finished piece while maintaining quality and managing production costs. Predictable EDM finishes can eliminate the need for a more expensive etched mold.

EDM Finish on Plastic Parts

The graphite grade used to create an EDM surface finish ***** (check this - looks like bottom of page cut off a sentence in my copy!!)******* product manufacturers try to control the appearance of plastic products by specifying a standard surface finish on their mold cavities. Molds often come from multiple vendors and it is expected that the finished plastic parts will have the same appearance. The surface of the final plastic part may not have the expected "look or feel" due to the grade of graphite electrode material.

The uniformity of the microstructure (particle size and pore size) of each graphite grade is different and the EDMed surface is a mirror image of the graphite material. Although the cavity will have the correct surface finish, the surface finish reading is an average of the high and low areas. The shape of the high and low areas is determined by the graphite grade. The uniformity of these areas is critical to the finished plastic and how light reflects off the surface.

The difference in graphite grades can be seen in the example below. These enlargements of the final plastic parts were molded from cavities completed with two different manufacturer's grades of graphite, but machined to the same specified finish.