

JB Precision Toys with EDM

INTRODUCTION

JB Precision, a family owned and operated mold shop located in Hatfield, MA (just on the outskirts of Springfield) has the knack of thinking outside the box when mold detail is pushed to the limits. With almost 40 years in the industry, owner Jim Finn began his journey in 1977 while graduating from a vocational institute in Northampton, MA. Since this time, Jim has worked his way from an apprentice position in a local machine shop to managing tool and die departments to opening his own shop in 2006. JB Precision is a mold builder for all types of applications and specializes in those with intricate detail such as cable ties and fasteners having lengths up to 48". The experience Jim has gained during his time in the industry offers the opportunity to view complicated tasks as a challenge to overcome. One such occasion arose when Jim was approached to produce a mold with a series of interchangeable inserts that was outside his normal scope of operation. Jim accepted the project while knowing it would take resources to a new level.

PROJECT

This project was to manufacture an injection mold for a miniature segmented military figure that could be pieced together with different details and create a diverse collection. This mold was to have interchangeable inserts to allow an assortment of components to be molded. These inserts were comprised of various details such as head, upper torso, and lower body sections as well as military accessories. The extreme detail requirement of these components produced the need to create a machining and EDM program that would replicate unique lifelike features (Figure 1) such as forearm muscles, hair texture, miniature communication equipment, and weapon features. Prior to the beginning of each job, the JB Precision production team meets to discuss the most feasible means of undertaking the project. This venture was no different and was treated with the same considerations as any other project at JB Precision.



Figure 1. Electrode, cavity, and molded part with lifelike facial features

PRODUCTION

The first task at hand was for Jim and his team to identify the electrode material they believed would be able to stand up to the task. This electrode would need to allow the machining of extremely fine detail and perform in the EDM with minimal electrode wear while achieving the required surface finish. Due to the extreme detail, draft could not be integrated into the design to facilitate part release and since polishing was not an option, surface finish in the cavity was a concern. For this project, Jim decided on EDM-3[®] graphite, a material he knew well and trusted. When questioned why Jim chose this material grade for the project, he responded "I have used Entegris' POCO graphite for many years and it always performs to my expectations. Using anything less than EDM-3 wouldn't allow me to produce a mold with complex irregular parting lines, while EDMing from solid with no pre-milling. EDM-3 material provides exceptional machinability and burns cleaner, faster, and maintains the detail needed in the cavity".

MILLING

The electrodes were machined on a HAAS “mini-mill” at a speed of 6,000 RPM with cutters ranging from 0.015” down to 0.008”. These extremely small cutters allowed machining the intricate detail with exceptional accuracy on the more delicate features such as a 0.010” antenna wire projecting from a backpack (Figure 2). To meet the tolerance requirements, the electrodes were machined with a 0.001” per side undersize on some details. One specific detail was the brim of a hat measuring 0.011” thick x 0.070” in length after molding. The time to machine each electrode ranged from 30 minutes for the head detail to 1 hour and 15 minutes for the lower body detail.

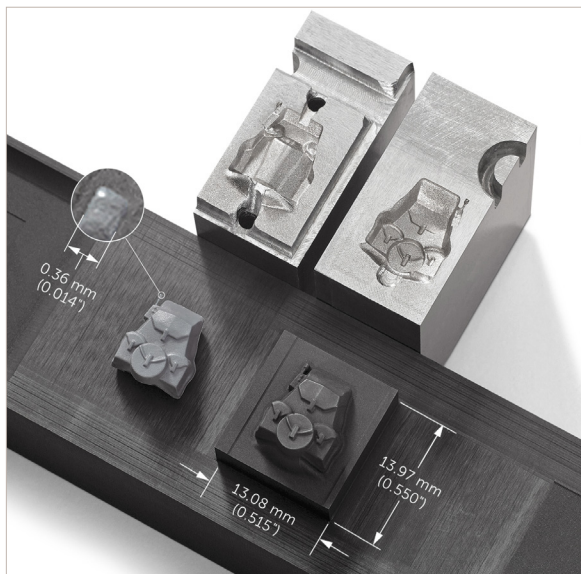


Figure 2. Electrode and insert showing antenna with 0.010” wire and 0.014” tip

EDM

The cavities were produced on an Agie Advance sinker EDM. The standard practice at JB Precision is to use one roughing electrode and one finish electrode. However, due to the intricate detail in the cavity, the fine surface finish required, and minimal undersize on the electrodes, Jim opted to produce three electrodes for each cavity. Since the cavities on this project would not have any pre-milling prior to EDM, Jim allowed the additional electrode to clean up any areas that needed that little extra touch. Nevertheless, it was noted that the job could most likely have been accomplished with only two electrodes since the third final finishing electrode performed very little work in the tank. Starting with the standard technology built into the Agie system, Jim used his years of experience to work with his team and “tweak” the program to better suit this specific application and electrode material. This allowed JB Precision to increase EDM performance efficiency and provide a product of the highest quality in minimal time.

OUTCOME

Jim coordinated this project with both the molder and end user to develop a timeline and completed the project with approval from the first article inspection. The only rework was normal minor revisions to mold gates and vents. This is the type of service JB Precision aims to provide with each project. According to Jim, JB Precision strives to “go the extra mile while being a service oriented mold producer with quality being a given, standard operating practice.” Jim also explains that he expects his suppliers to operate in the same manner and believes Entegris’ POCO materials operate to the same standards.



JB Precision Team from left: Jason Subocz (wire EDM), Matt Finn (milling), Mike Gale (apprentice), Mark Pierce (sinker EDM), and Jim Finn (owner)

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