

Revolutionary Software for CNC Sinker Programming

iMFLUX is a wholly owned subsidiary of Procter and Gamble headquartered in Hamilton, OH. The 130-employee company delivers savings, speed, and innovation to P&G, P&G suppliers and external partners in the injection molding industry. iMFLUX offers services of proprietary process technology, world class tool design and manufacturing, and innovation services.

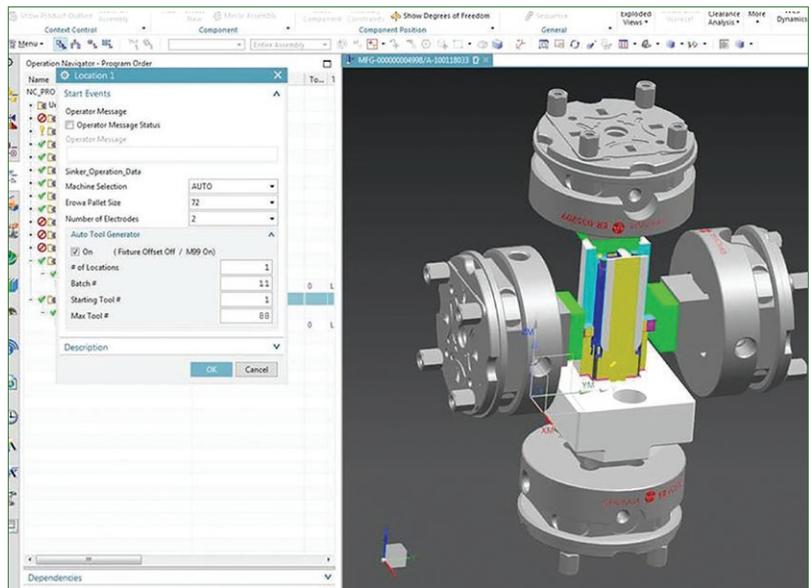
A Manufacturing Challenge

While developing internal systems and procedures, there was a definable gap between the CNC programming solutions that existed for manufacturing methods of milling and turning, and the lack of CNC programming solutions that exist for Sinker EDM. Through researching this topic, it was found that the industry, for the most part, had settled upon the fact that machine control programming is the “way it is done.” iMFLUX, as a company, had adopted Siemens NX as its mold building and manufacturing information engine, and a solution for this application would be invaluable to iMFLUX’s mold manufacturing success.

The former process of programming Sinker EDM involved viewing an electrode file in CAD software, manually recording information on paper, and repetitively programming manually on the machine control. This process could be repeated more than fifteen times depending on job requirements. The average process time for each loop of this process was 42.5 minutes and was prone to manual entry errors.

The operators were required to program multiple parts with various unique electrodes with numerous positions while “shuffling” electrodes. Shuffling is a process where finisher electrodes are used, then re-used as semi-finishers or roughers. Operators were required to constantly review the machine technology information while programming. Due to the errors encountered, the machine control programs were repeatedly reviewed and dry-run. This process added significant and non-value-added time to the Sinker EDM process.

The flexibility of the programming process left a lot to be desired. When part or process changes occurred,



the programming origin could shift. The moving of a programming origin required a complete reprogram of the operation. Also, the addition of automation technology made programming more difficult and time consuming.

In addition, the process did not take advantage of the CAD integration product lifecycle management (PLM) software that other CNC programming areas were utilizing. The manual programs were saved in the machine control and not definitively tied to a design CAD model revision. This allowed old programs to be run on new part revisions. The traceability of programs and part revision was left to the operator recording data in the program name.

A Solution to Automate NX Sinker EDM Programming

iMFLUX developed a custom solution to integrate the Sinker EDM programming with Siemens NX CAD/CAM software and Siemens Teamcenter Product Lifecycle Management software. The new process uses NX’s manufacturing application to generate G code for the Sinker EDM process – similar to the process of mill or lathe programming.

The new process involves the electrode designer generating “EDM removal file assemblies” for mold components that include geometry, reduction, and positions.

The Sinker EDM programmer creates a manufacturing file, utilizing an NX template that references the EDM removal file assembly and creates a program. This program is linked to the EDM removal file assembly which is linked to the CAD design. This method maintains traceability and revision control within NX and Teamcenter.

The process of NX Sinker EDM programming allows the machine technology to be present in the background, being correctly applied based on programming inputs. The process features an automatic tool generator, efficiently condensing the time required to program multiple electrodes at various locations. With the tools created, the part geometry is selected, and the correct inputs are configured.

The Solution Results

iMFLUX measured programming time results of the process in a case study performed on a production healthcare mold. The design CAD was referenced in the “EDM removal file assembly” by the Electrode Designer for each part that required Sinker EDM operations. The Sinker EDM programs were created in NX prior to parts being available for the EDM operation.

The case study results showed an immense efficiency gain. The Sinker EDM programming time was reduced by 85-88% (see Fig #1 and #2). The process simplified what would have been very difficult to program on the control. The robustness of the process, coupled with the use of automation, allowed over 1,350 unattended tool changes. “It would have been a nightmare trying to program the new Healthcare mold with the old way of programming,” according to John Edwards and Rick Snyder, iMFLUX EDM Programmers/Machinists.

The accuracy and repeatability of the generated features increased versus previous molds that were programmed at the control due to the elimination of manual errors and process control enabled by programming to CAD data. The result is a significant reduction in non-conformances. “We haven’t seen such consistent inspection data from part to part until the implementation of the new process,” stated Ryan Collins, Metrology Manager, iMFLUX.

Standards for the NX Sinker EDM programming process have been documented and training has been implemented within iMFLUX’s Sinker EDM cell. By controlling the way components are programmed with process instructions, NX templates, and machine technology, this custom solution has bestowed repeatable results.

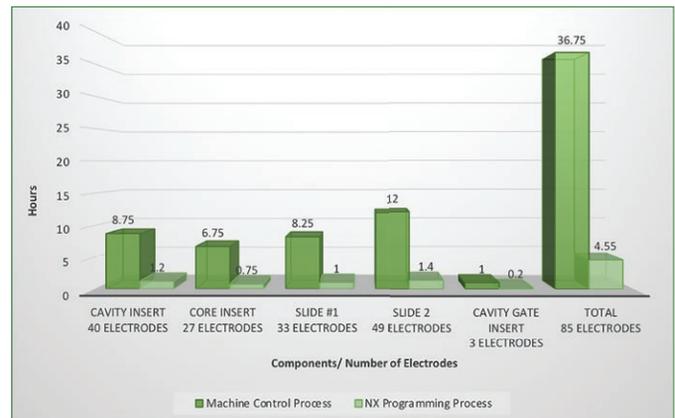


Fig #1: Case Study - Healthcare Mold - First Piece Programming

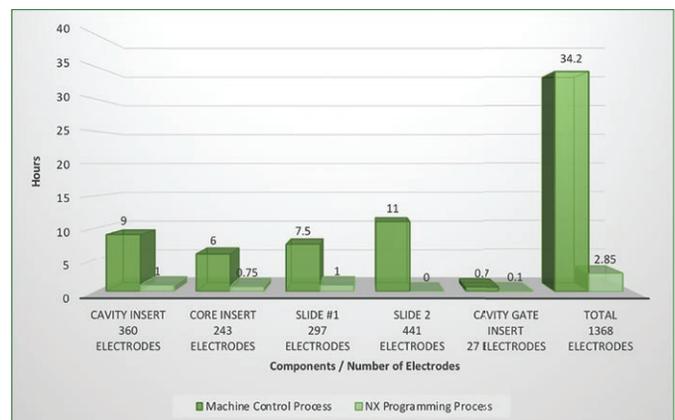


Fig #2: Case Study - Healthcare Mold - Piece 2-10 Programming

More recently, 80 gate details on cavity inserts were all produced within ± 3 microns to the part design. The first part was proved out and inspected. The remaining 79 parts were processed with no adjustments necessary.

The NX Sinker EDM programming custom solution derived at iMFLUX has already paid dividends of efficiency and quality even in its alpha phase. The development team on the project is working to continually refine and iterate on the process to improve the benefits it allows. The mold industry relies on the precision workmanship and agility of the mold manufacturing community. The NX Sinker EDM programming process further enables iMFLUX to please its customers.



www.imflux.com

Contact: Gary Bare

Advanced Manufacturing Engineer/iMFLUX

bare.gs@imflux.com

