

ModuleWorks and SolidCNC application study

Traditional Stone Working and Modern Cutting Technologies

This application study takes a look at how traditional stone working is made more efficient through the use of modern CAD/CAM technology.



SolidCNC is a Turkish CAD/CAM vendor which develops an easy to use solution for milling, wire and turning applications for manufacturing. The company recently partnered with ModuleWorks, the leading supplier of components for toolpath generation and simulation to provide enhanced 3-Axis toolpath strategies and material removal simulation.

Adnan Bektüre is a SolidCNC customer, based in Istanbul, Turkey. He is a traditional stone work master whose skill is the restoration of mosques and churches and the construction of traditional Islamic stone works named "muqarnas".

An example of the type of application is shown below with the image on the right showing the complex detail of the stone work.



Sahip Ata mosque (1258 A.D.)

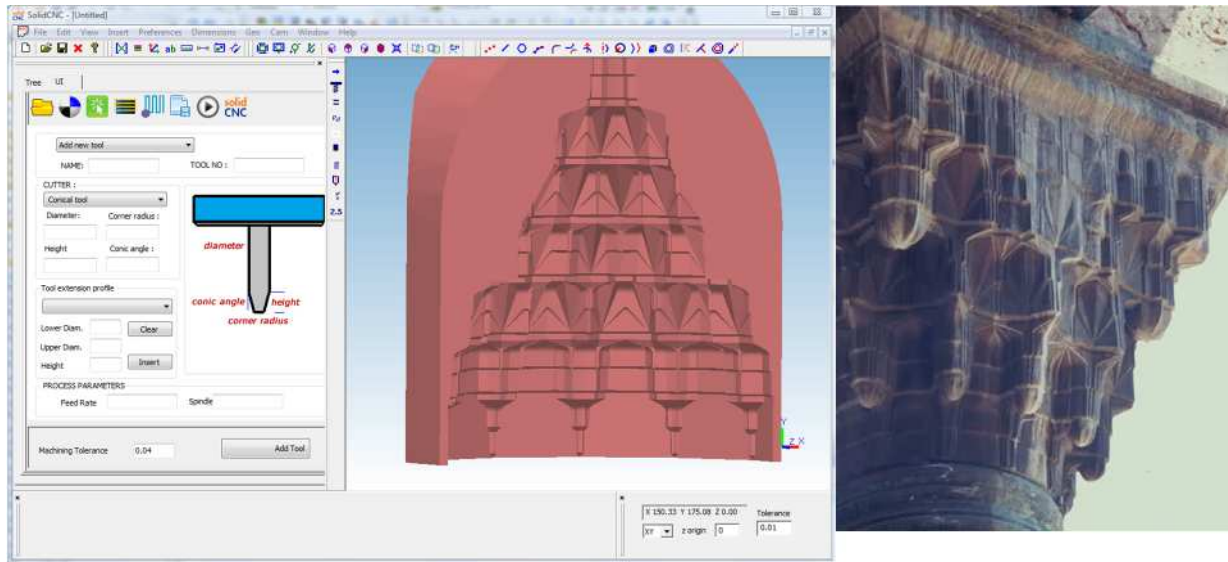


Traditional Islamic "muqarnas"

Although this is a very traditional skill, steeped in history, Adnan is able to benefit from modern CAD/CAM and machining technologies. In his workshop, he has two CNC routers that are used for machining molds and other parts whenever needed.

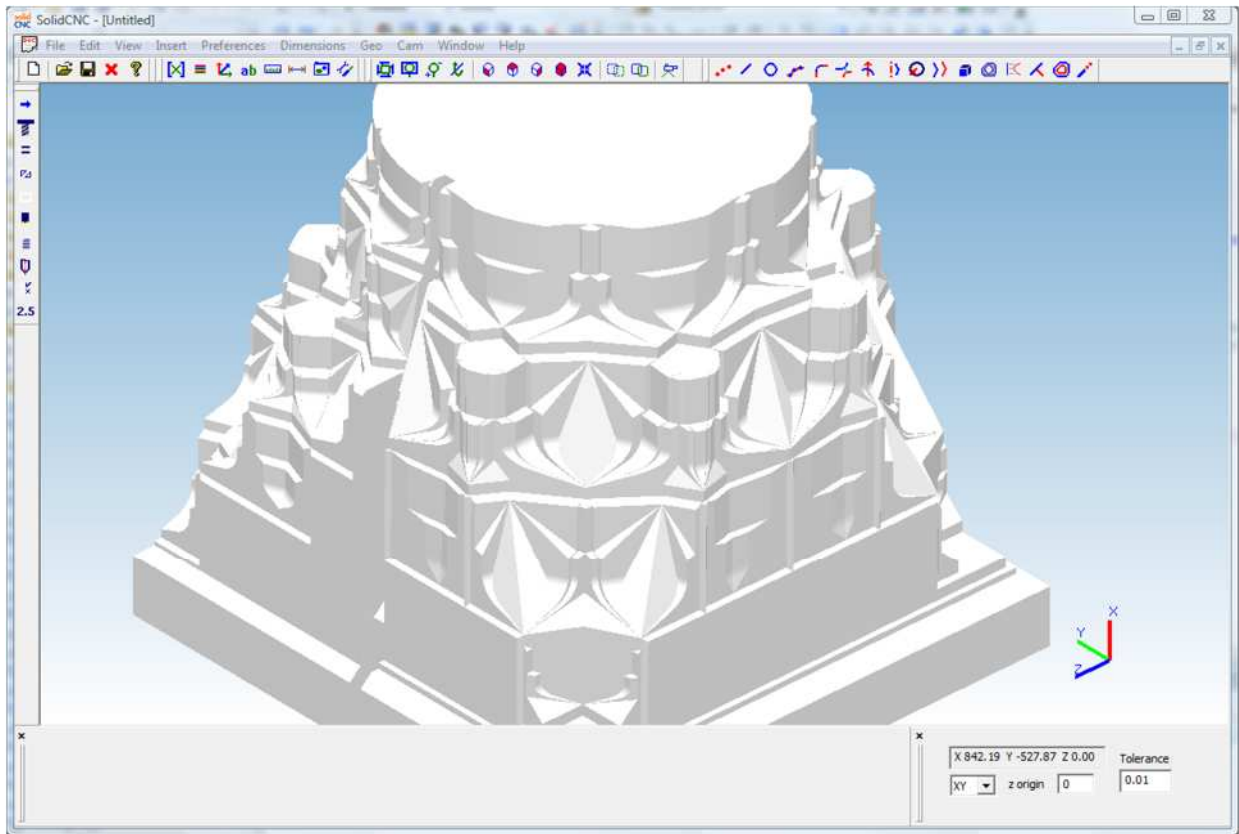
A number of diverse methods are required to construct and machine the geometric shapes and models. Models may be prepared directly from foam or engineering plastic or the marble machined directly but other examples may require the inverse mold to be created.

SolidCNC provide all the tools required to both construct the model and generate the toolpaths. In the images below, we can see the screen shots from SolidCNC along with the highly complex and detailed final result on the right.

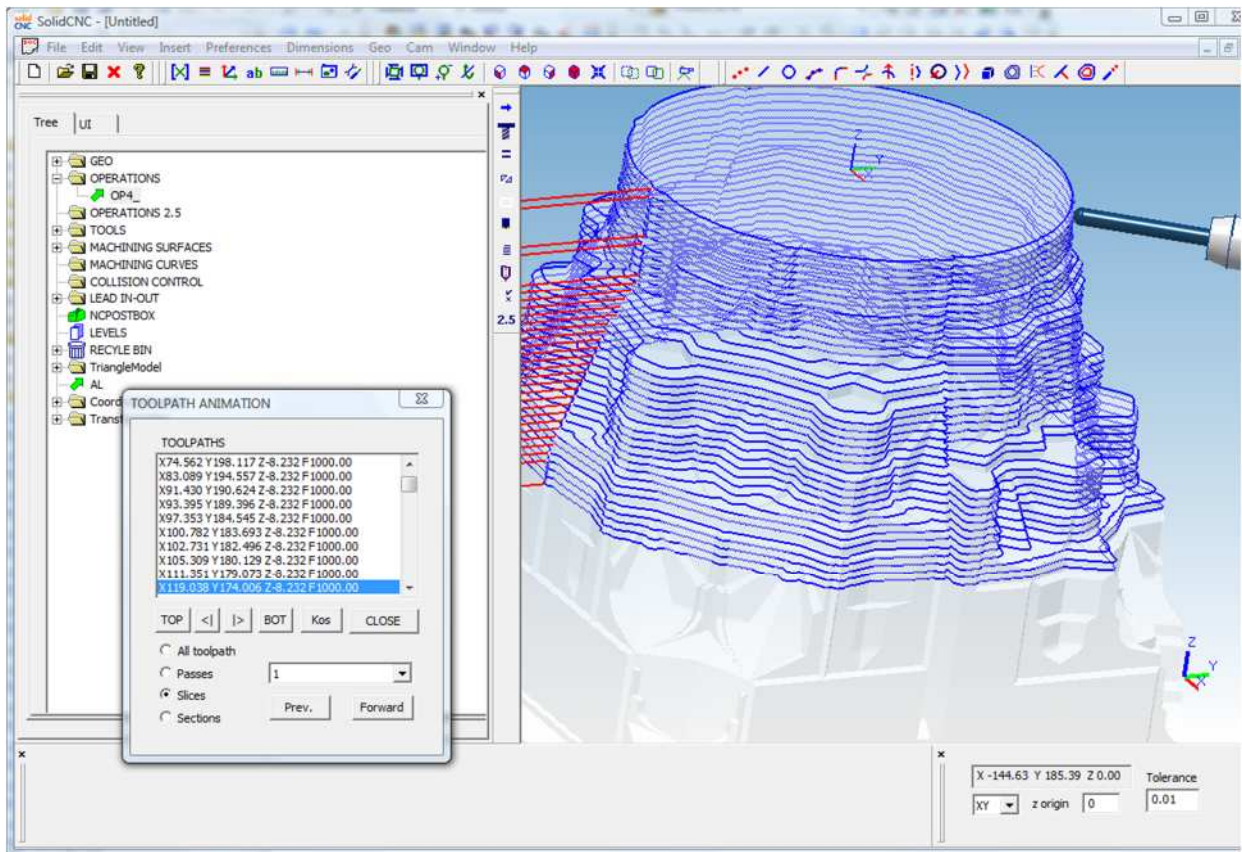


There are a number of stages to creating the stone models in SolidCNC. The first stage is to prepare the geometry for machining, followed by toolpath creation for 3-Axis rough and finish passes. Prior to the actual machining, verification takes place using the inbuilt simulation tools helping to ensure safe operation on the CNC router. In addition to the 3-Axis toolpaths, SolidCNC also provides him with a range of 4-Axis simultaneous toolpaths for the more complex and intricate models.

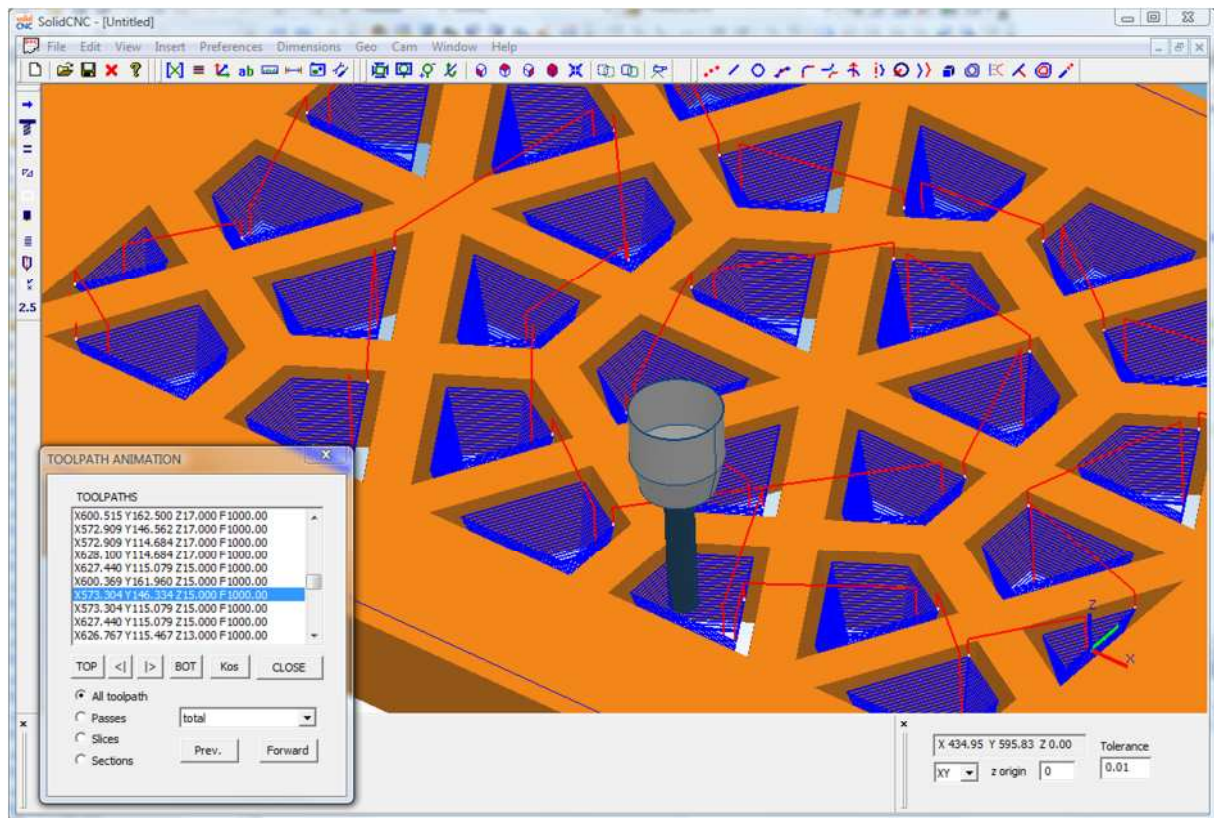
These different stages are shown in the images below:



Model imported to SolidCNC and prepared for Manufacture

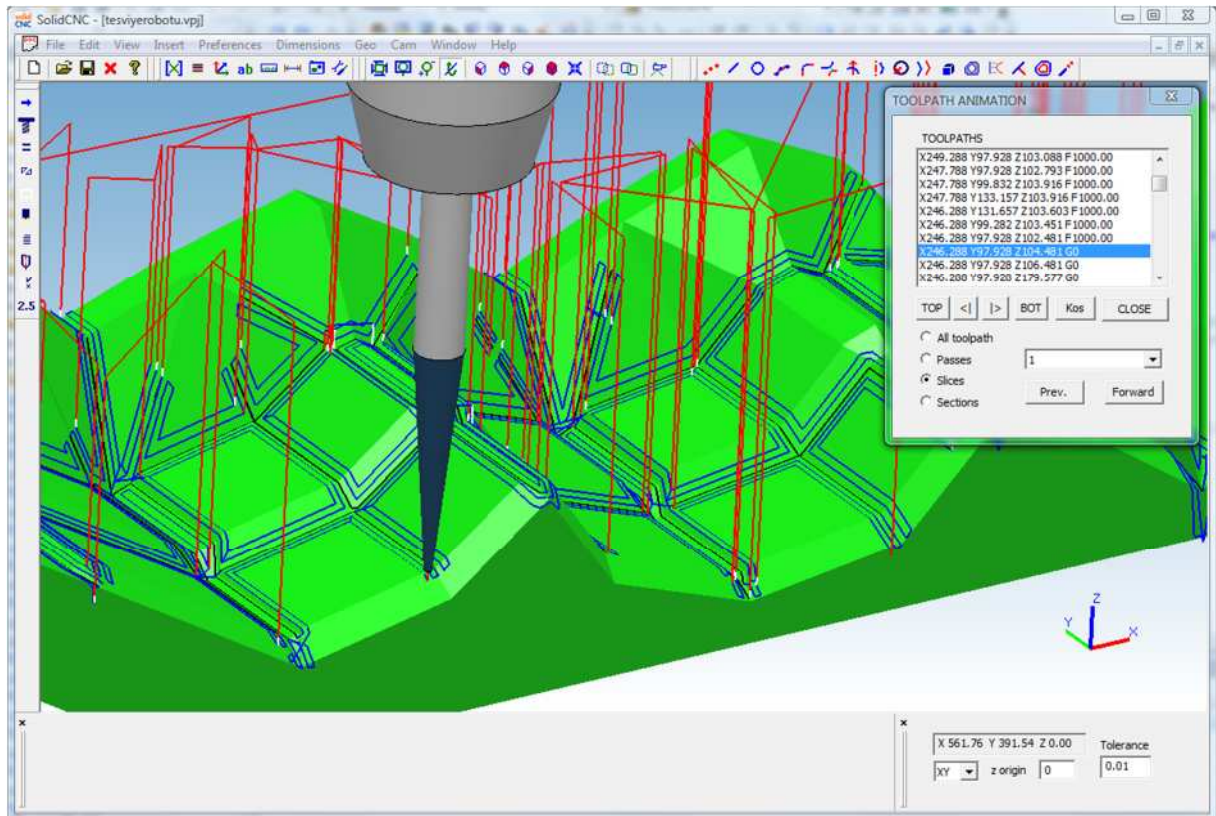


Finish Machining using a constant Z strategy



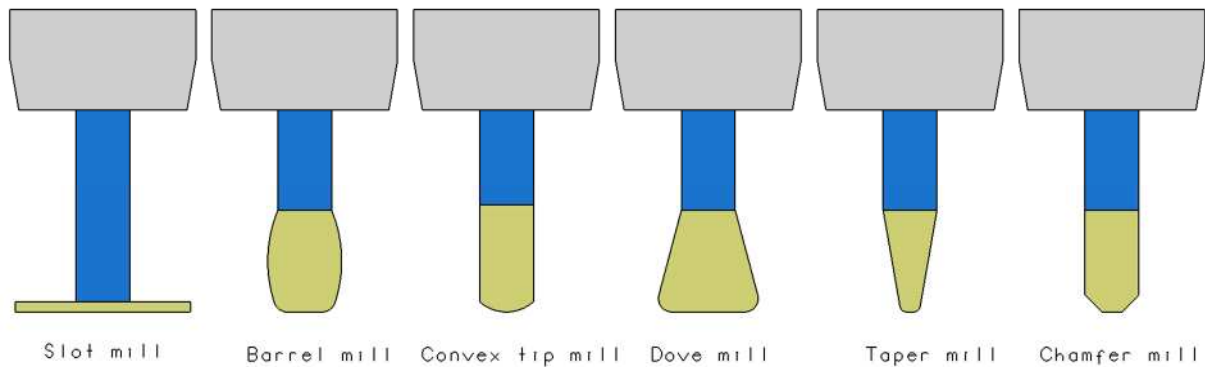
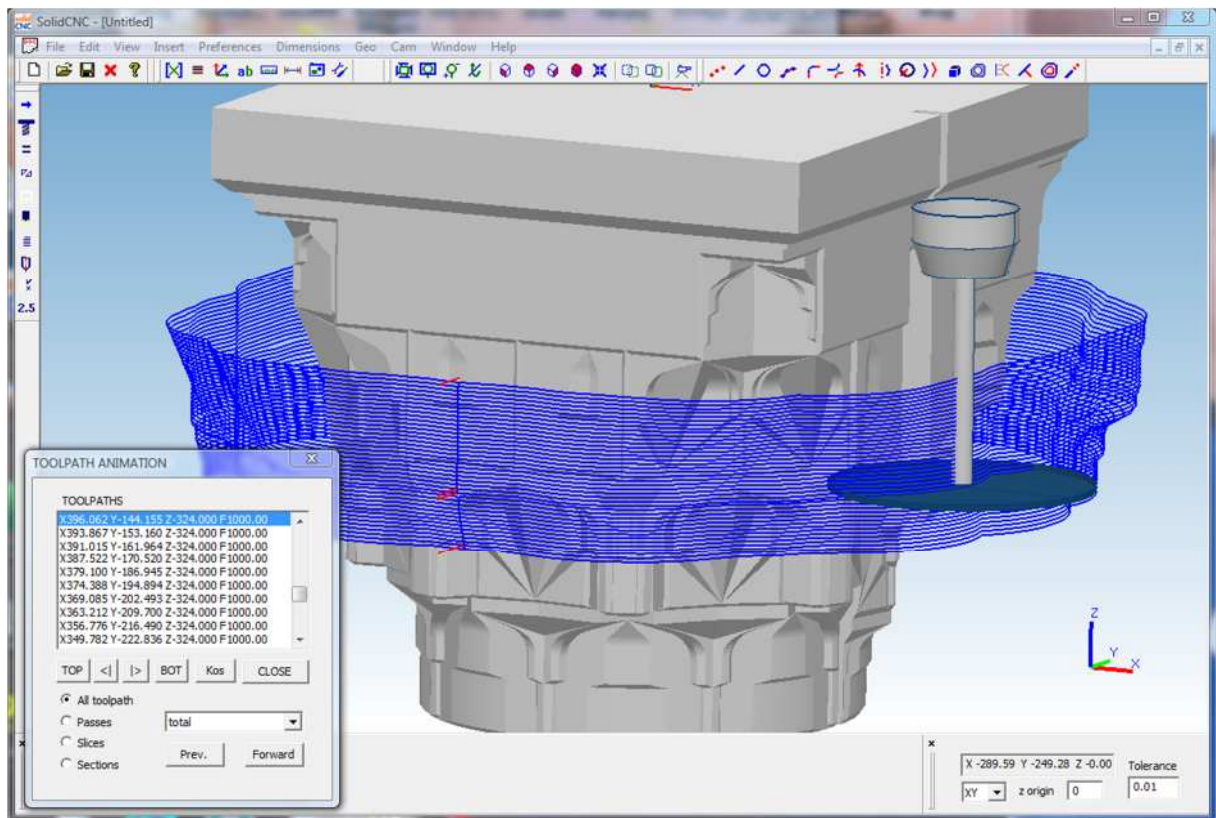
Toolpath Verification

Adnan states that he is very happy with the SolidCNC software commenting that “ SolidCNC is a very flexible solution as it supports a wide range of different cutting tools and machining strategies. In addition to the conventional milling cutters, I am able to program using blades or custom made special tools for my stoneworking projects and the powerful multi-pencil toolpath has eliminated much of the hand polishing work that was previously required”. The pencil milling strategy is shown in the image below being used to create the finish passed on stonework model.



CNC Milling machine turns into a hand-finishing robot by multi-pencil toolpaths

As Adnan mentions above, SolidCNC milling supports many special tooltypes giving additional power and flexibility to the machinist, particularly with undercutting applications such as the example shown below.



Undercut and Special tooltype support with SolidCNC

In summary, Adnan has shown how traditional stoneworking skills and techniques can be blended with modern CAD/CAM techniques to improve manufacturing efficiency . The results are truly impressive.

Case study prepared by Ata Hürdoğan Demiray, CEO SolidCNC.

All Images Courtesy of Adnan Bektüre

About SolidCNC

SolidCNC is a CAM provider servicing the manufacturing industry and specializing in Mold and Die technology. Products include solutions for Milling, Wire and Turning applications.

About ModuleWorks

ModuleWorks is a software component provider for the CAD/CAM industry. ModuleWorks' expertise in 5-Axis simultaneous machining and Simulation is recognised throughout the CAM industry and its software components and development services are used by the majority of the leading CAM vendors. ModuleWorks 5-Axis and Simulation software has been used in the manufacture of complex parts for over a decade and they have many users in the global CAD/CAM industry.