Evaluation of the Pyramid Fixture
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Aim of the Project

The aim of the project is to evaluate the accuracy of the machine and the fixture in operation.

Background

In machining and manufacturing operations, multi-part work holding fixtures typically refer to objects used to hold several workpieces in place for machining at the same time. By enabling multiple parts to be machined in a single setup, this allows for multiple parts to be loaded and unloaded which will decrease downtime in set up. Usually, these fixtures are made up of a base with several movable clamping mechanisms or jaws that can be used to accommodate different shapes and sizes of parts. Manufacturers can increase productivity, decrease labour costs and setup time, and enhance accuracy by securely holding multiple parts at once

These bodies are typically made of materials which are suited for its application. Steel is a very popular choice due to its strength and its high durability. Aluminium is also admired due to its light weight and sturdy attributes and cast iron is also valued due to its ability to dampen and absorb vibrations while the machine is in operation. Pyramid fixtures as the name suggest typically come in a pyramid shape which also allows it to be quite versatile as the angles and the number of faces can vary.

Why use a multi-part fixture

in many industries, the use of a multi-part work fixture in CNC machining is chosen due to its numerous advantages. Engineering companies choose to use multi-part work fixtures for the following reasons:

Enhanced Efficiency: Multiple workpieces can be machined simultaneously with multi-part fixtures. This can boost overall production flow and cut down on the amount of time needed to machine each part individually. Efficiency is increased because machine inactivity between machining processes is reduced when numerous components are handled in a single operation.

Precision and Consistency: All machined parts are guaranteed to be precise and consistent when a multi-part fixture is used. Variations resulting from setup changes or operator mistake are avoided when all parts are machined under identical setup conditions, providing consistent quality and accurate features on the parts when they are machined.

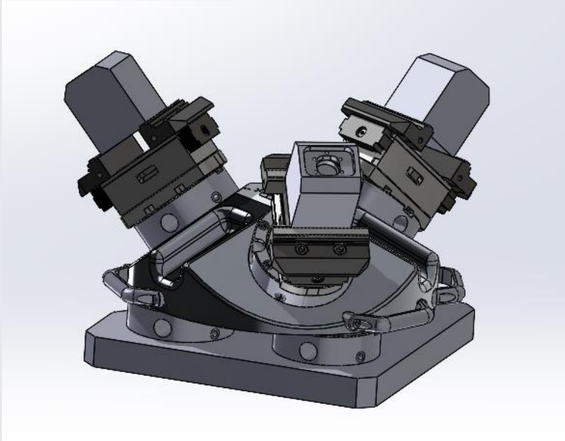

Figure 1: pyramid fixture in solid works

Machine simulation

Efficient Programme

In order for the fixture to be efficient it also needs an efficient programme to go with it which will implant strategies in order to save time around the programme like machining one feature at a time on each of the components first as this will save time with tool changes by keeping out the same tool as long as possible to machine the necessary features first before moving onto the next operation of the programme that will do the same thing with the next tool change.

Simulation

A necessary machine simulation will have to be made to demonstrate that the spinner-u620 will be able to operate on the pyramid fixture while having limited space to work with. This will show exactly how the fixture will get moved around so that all the components can be machined, and this will also show if there are any bugs inside of the programme that need to be rectified before machining in real-time

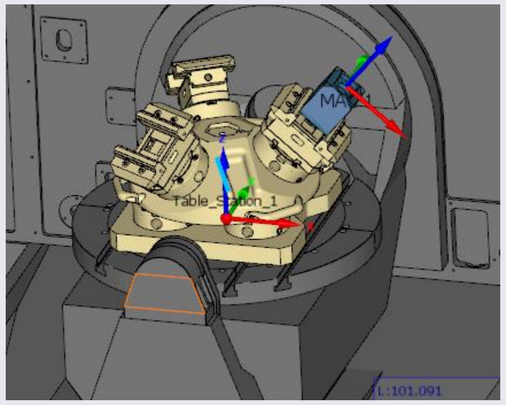

Figure 2: pyramid fixture in machine simulation

Conclusion

Figure 3: pyramid fixture in the workshop

An efficient programme was made to simulate the machining process of the components on the pyramid fixture. Unfortunately there was an error within the solid works application causing the machine simulation to crash every time it was prompted to start.

The fixture was also tied up in multiple other projects as well and unfortunately couldn't be used for machining until the fixture was anodized by another peer.

In order to progress with the pyramid, a solution is going to have to be found in order to stop the programme from crashing to see if the parts can be machined safely with no flaws and that the finished parts can then be analysed by a CMM so that the project can be evaluated.