



RAPID PROTOTYPE VS CNC

WHEN CONSIDERING THE PROS AND CONS OF RAPID PROTOTYPING (RP) AND CNC TECHNOLOGY THE CHOICE GENERALLY WILL BE BASED ON THE PROJECT AT HAND BUT WHAT ASPECTS OF THESE MANUFACTURING METHODS MUST BE CONSIDERED BEFORE THE COMPLETION OF THE PRE-MANUFACTURING DESIGN PROCESS AND COULD MANUFACTURING COSTS AND TIME BE REDUCED BY FULLY UNDERSTANDING WHAT BOTH OPTIONS OF MANUFACTURING CAN OFFER.

PROTOTYPING METHODS HAVE DEVELOPED QUITE SIGNIFICANTLY IN THE PAST 15 YEARS AND THOUGH RP TECHNOLOGIES OFFERED AN OBVIOUS SPEED ADVANTAGE IN THE PAST, RP WAS LIMITED BY ACCURACY AND MATERIAL PROPERTY ISSUES. THESE ISSUES ARE NO LONGER THE CASE AND WITH THE DEVELOPMENT OF CNC OVER THE LAST FEW DECADES THE RP TECHNOLOGY INDUSTRY HAVE PUT CONSIDERABLE INVESTMENT KEEPING A SEAT AT THE MANUFACTURING TABLE. TODAY RP TECHNOLOGIES SHOULD NOT BE CAST ASIDE AS A METHOD FROM THE PAST THAT HAS NOW EVOLVED INTO CNC, IT'S IMPORTANT TO UNDERSTAND WHAT BOTH METHODS CURRENTLY OFFER IN ORDER TO CHOOSE THE RIGHT TOOL FOR THE JOB AND STAY UNDER BUDGET. THE FOLLOWING GUIDELINES WILL AID IN THE SELECTION PROCESS.

A Comparison between rapid prototyping and CNC technology

Materials

RP: Limited

RP is often discarded due to the material property limitations but today the RP industry material list includes metals, plastics, ceramics and composites. Yet, the selection is still somewhat limited.

CNC: Nearly unlimited

Aside from gas, CNC will mill pretty much any material, aerospace companies will not be considering RP in the near future.

Maximum Part Size

RP:

24x36x20 in. (600 x 900 x 500 mm)
Although commercially available units may not be able to handle an instrument panel or bumper, the available build envelopes are suitable for the majority of consumer and industrial products. Should a part be too large for the system, it can be constructed in sections and glued. An important consideration is the impact of size on time. Larger parts take longer to build.

CNC:

The size is only limited to the size of the machine from small CNC units next to the computer monitor to large systems building planes, CNC machining will mill parts and molds of any size. The bigger the project the bigger the CNC machine required.

Part Complexity

RP: Unlimited

If it built in the computer it can be built using RP with insignificant time and cost issues, this is always going to be the advantage of RP production.

CNC: Limited

In general, only straight lines and circular arcs are understood by machines in older machines. Restriction to the XYZ planes is also common so the actual machines in question are as important as the technology itself in the selection of what to use. CNC is also limited by cost and time and though a five-axis machine can cut any form, it does not come without long hours of programming from highly qualified technicians and constant tool changes during the process.

Accuracy

The key to really understand this aspect of the two manufacturing methods is not necessarily the numerical representation of a cut. Though CNC will always hold the the most accurate cuts if RP and CNC go head to head, but in reality most CNC jobs sacrifice accuracy to save time and cost, unlike with RP the option of ultimate accuracy is there but rarely used.

RP: 0.005 to 0.030 in. (0.125 to 0.75 mm)

CNC: 0.0005 to 0.005 in. (0.0125 to 0.125 mm)

Accuracy of Surface Finish

RP: Ra 100 to 600 in. (2.5 to 15 microns)

CNC: Ra 20 to 200 in. (0.5 to 5 microns)