Surface roughness analyses of engineering polymers

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Thesis Summary:

During these last few years, polymers has been taking a growing interest in the field of manifacturing and production. The object is to put in the production and in the market some materials having some advanced thermomechanical properties.

Nowadays, polymeric materials are known for their easier transformation and so they are largely used in all industrial sectors. However, the level of exigence in quality and performance of materials based on polymers has been growing and it is still growing in an enormous level. That means that those materials will require more and more development in the future so they can replace metals in a big part of the industry.

The surface roughness in polymers is one of their most important characteristics. Manufacturers aim to go for materials that are not affected by some machining problems. Those materials help the manufacturers offer better quality for the customer and also prevent them from some economical problems.

The reason why I chose this subject is that polymers are now part of our daily life, and more importanlty part of all manifacturing processes. Manufacturers seemed to be more into using polymers than other materials lately. And as a mechanical engineer, it is important to understand the functioning of polymers during the manufacturing and how does the surface roughness affect its machinability.

The aim of this thesis is to:

-Provide an understanding of the difference between surface roughness characterizations during the machining of polymers with the change of some important parameters during the work especially the spindle's speed and the spindle's feed.

-Study the difference between three kinds of engineering polymers and how the change of the parameters cited before will affect their surface roughness.

We divided the research work into 3 parts :

-Machining (Roughing and Finishing) of the applied materials using different feeds.

-Calculating the surface roughness after each machining three times means we calculate the surface roughness for each machined workpiece three times with a rotation angle of approximately 120°.

-Comparing the different surface roughness using Excel, and Word. This comparison is either related to the feed rate, the applied material, or the surface roughness.

At the end of our research word, we concluded that each polymer has its own characteristics and morphology, so each polymer can be used in a different application taking into consideration a lot of factors both economically and mechanically.