INTRODUCTION:
Turning is the removal of metal from the outer diameter of a rotating cylindrical work piece. Turning is used to reduce the diameter of the work piece, usually to a specified dimension, and to produce a smooth finish on the metal. Often the work piece will be turned so that adjacent sections have different diameters. Turning is the machining operation that produces cylindrical parts. In its basic form, it can be defined as the machining of an external surface:-
- With the work piece rotating,
- With a single-point cutting tool, and
- With the cutting tool feeding parallel to the axis of the work piece and at a distance that will remove the outer surface of the work.

In this challenging world, industries around the world constantly strive for lower cost solutions with reduced lead time and better surface quality in order to maintain their competitiveness. Automated and flexible manufacturing systems are employed for that purpose along with computerized numerical control (CNC) machines that are capable of achieving high accuracy and very low processing time. In the CNC machining, determining optimal cutting conditions or parameters under the given machining situation is difficult in practice. Conventional way for selecting these conditions such as cutting speed and feed rate has been based upon data from machining handbooks and/or on the experience and knowledge on the part of programmer. As a result, the metal removal rate is low because of the use of such conservative machining parameters.

Turning is the first most common method for cutting and especially for the finishing machined parts. In a turning operation, it is important task to select cutting parameters for achieving high cutting performance. Cutting parameters are reflected on surface roughness, surface texture and dimensional deviations of the product. Surface finish obtained in manufacturing processes mainly depends on the combination of two aspects: the ideal surface finish provided by marks that manufacturing process produces on the surface and the actual surface finish which is generated taking into account irregularities and deficiencies that may appear in the process, changing manufacturing initial conditions. The purpose of this project work is to investigate the surface roughness on engineering components by turning process. To achieve the result of surface roughness, the material used for the investigation is AISI D2 (three levels of hardness). Thus, the surface roughness is planned to be measured and observed in the experiment.

LITERATURE REVIEW
R. Suresh[1], In the present study, performance of multilayer hard coatings (TiC/TiCN/Al2O3) on cemented carbide substrate using chemical vapor deposition (CVD) for machining of hardened AISI 4340 steel was evaluated. An attempt has been made to analyze the effects of process parameters on machinability aspects using Taguchi technique. Response surface plots are generated for the study of interaction effects of cutting conditions on machinability factors. The correlations were established by multiple linear regression models. The linear regression models were validated using confirmation tests. The analysis of the result revealed that, the optimal combination of low feed rate and low depth of cut with high cutting speed is beneficial for reducing machining force. Higher values of feed rates are necessary to minimize the specific cutting force. The machining power and cutting tool wear increases almost linearly with increase in cutting speed and feed rate. The combination of low feed rate and high cutting speed is necessary for minimizing the surface roughness. Abrasion was the principle wear mechanism observed at all the cutting conditions.

Zahia Hessainia[2], This research work concerns the elaboration of a surface roughness model in the case of hard turning by exploiting the role surface methodology (RSM). The main input parameters of this model are the cutting parameters such as cutting speed, feed rate, depth of cut and tool vibration in radial and in main cutting force directions. The machined material tested is the 42CrMo hardened steel by Al2O3/TiC mixed ceramic cutting tool under different conditions. The model is able to predict surface roughness of Ra and Rt using an experimental data when machining steels. The combined effects of cutting parameters and tool vibration on surface roughness were investigated while employing the analysis of variance (ANOVA). The quadratic model of RSM associated with response optimization technique and composite desirability was used to find optimum values of cutting parameters and tool vibration with respect to announced objectives which are the prediction of surface roughness.

Mustafa Gunay[3], This paper focused on optimizing the cutting conditions for the average surface roughness (Ra) obtained in machining of high-alloy white cast iron (Ni-Hard) at two different hardness levels (50 HRC and 62 HRC). Machining experiments were performed at the CNC lathe using ceramic and cubic boron nitride (CBN) cutting tools on Ni-Hard materials. Cutting speed, feed rate and depth of cut were chosen as the cutting parameters. Taguchi L18 orthogonal array was used to design of
experiment. Optimal cutting conditions was
determined using the signal-to-noise (S/N) ratio
which was calculated for Ra according to the “the-
smaller-the-better” approach. The effects of the
cutting parameters and tool materials on surface
roughness were evaluated by the analysis of variance.
The statistical analysis indicated that the parameters
that have the biggest effect on Ra for Ni-Hard materials
with 50 HRC and 62 HRC are the cutting speed and feed rate, respectively. Additionally, the
optimum cutting conditions for the materials with 50
HRC and 62 HRC was found at different levels.
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specified compact CNC turning centre. Since, this is a material in a special class i.e. MMC, not much research have been done on the same and this would be helpful in improving productivity at a reasonable level of quality.

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