New trials were conducted to decide levels for final experiments using response surface methodology with the new SM geometry of CNMG 1125 grade. New trial parameters were selected randomly based on previous trials and observations. Table 6 shows the parameters which were selected for new trials.

Table 6: Parameters for random trials

Sr. No.	*Cutting Velocity in m/min*	*Feed in mm*	*Depth of Cut in mm/rev*
1	30	0.3	1.2
2	70	0.3	0.8
3	90	0.2	0.6

Figure 5 shows the machined workpiece and figure 6 shows chips formed during machining.

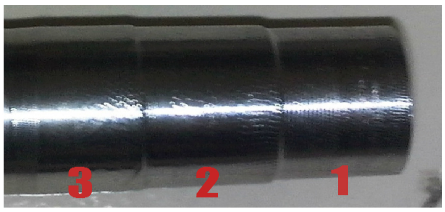

Figure 5: Workpiece machined in random trials

Figure 6: Chips formed during random trials

It was found that in random trials the chips form easily. Discontinuous types of chips were formed. No chip were interference with tool-tip so no mark of chips on workpiece. Improvement in chip breaking of machined work piece obtained. But good surface finish not obtained than previous results in these random second trials. These were happened because of very large feed so it will better to take feed value less than 0.2 in actual machining.

5. Conclusions

After successful completion of experiment, some observations were found out they are as follows:

- Machining of Inconel 718 was not possible at very high speed of 120 m/min the tool tip wear out suddenely producing burnt chip shown in figure 4. Trial 7, trial8 and trial 9 shows this type of burned chips because of tool wear. Its main reason was very high temperature generation takes place at cutting zone. Uneven machining also found out on this workpieces shown in figure 3. So it is very important to machine workpiece below the speed of 100 m/min.
- While machining Inconel 718 it was also observed that at high speed if we would take depth of cut more than tool nose radius that was 0.8 mm it support to rapid wear of the tool so it is strongly recommended to limit the depth of cut up to 0.8 mm at high speed machining.
- For experimentation SF (Finish Geometry) were used. Insert doesn't keep its strength for such a geometry used; Material removal rate is important response so large depth of cut and feed should be taken as processing parameters. So new SM (Medium Geometry) should be employed.
- From second random trial experiments, it was found that large feed that was 0.3 mm/rev result in discontinuous type of chips. But surface roughness of machined workpiece was also increased. So feed should be limited to 0.2 mm/rev.

6. Future Scope

There is scope for finding out optimized machining condition for superalloy using CNMG FS – 1125 all the responses like surface finish, material removal rate, cutting forces etc which is under process. There is scope to develop new tools and machining methods, which will give good machining conditions. Proper modeling for machining superalloy is important to understand and define behavior while machining such materials. There is scope for research in environment friendly machining of superalloys with minimum quantity lubrication. There is scope for high speed finishing of superalloys and find out residual stresses and change in microstructure can be found out. One can do research to find out tool life while machining superalloys.

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