

ME 409_LAB 4_REPORT

ORTHOGONAL MACHINING SIMULATION

20D100023_Samay Jain

Model used-john cook model

Material used - Inconel 718

I) Thermo Physical Properties of Inconel 718

S. No	Parameter	Inconel 718
1	Density (kg/m ³)	8195
2	Young's Modulus (GPa)	200
3	Poisson ratio	0.3
4	Thermal conductivity(W/m ⁰ C)	11.4
5	Specific heat(J/Kg/ ⁰ C)	430

Johnson-Cook parameters for Inconel 718

A (MPa)	B (MPa)	C	n	m	T _m (⁰ C)	T ₀ (⁰ C)
450	1700	0.017	0.65	1.3	1225	20

Johnson-Cook fracture model parameters for Inconel 718

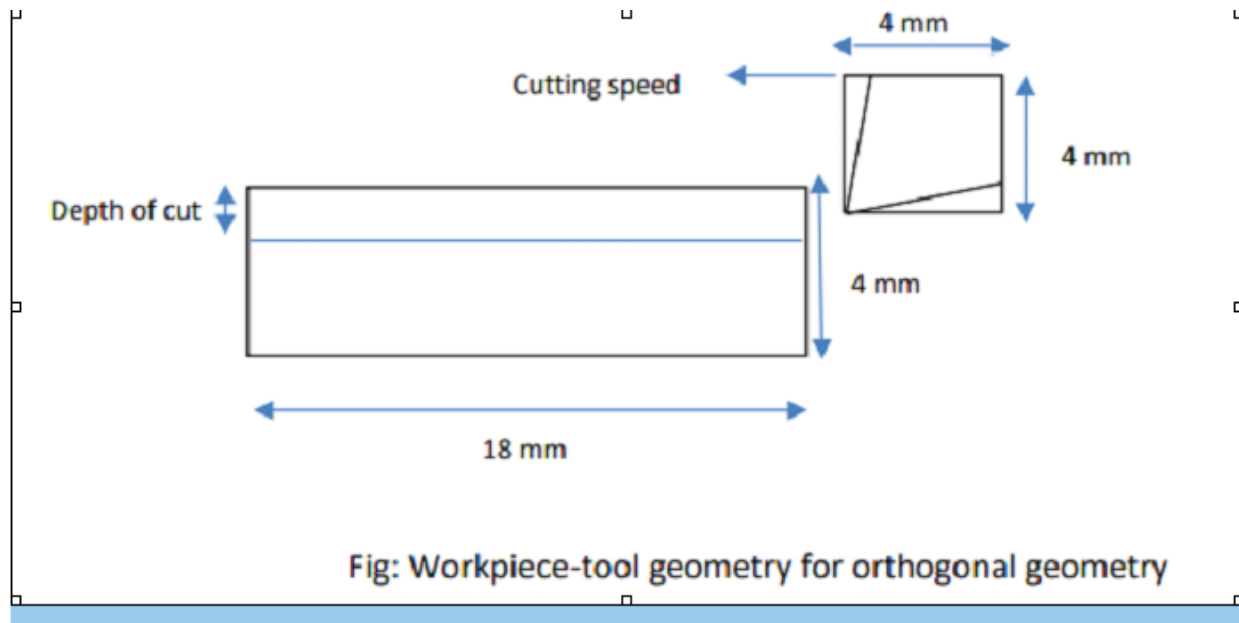
d1	d2	d3	d4	d5	ε ₀
0.11	0.75	-1.45	0.04	0.89	1

Tool material

4) Thermo Physical Properties of Carbide tool (for all cases)

S. No	Parameter	Carbide tool
1	Density (kg/m ³)	15700
2	Young's Modulus (GPa)	705
3	Poisson ratio	0.23
4	Thermal conductivity(W/m ⁰ C)	24
5	Specific heat(J/Kg/ ⁰ C)	178

Material Geometry

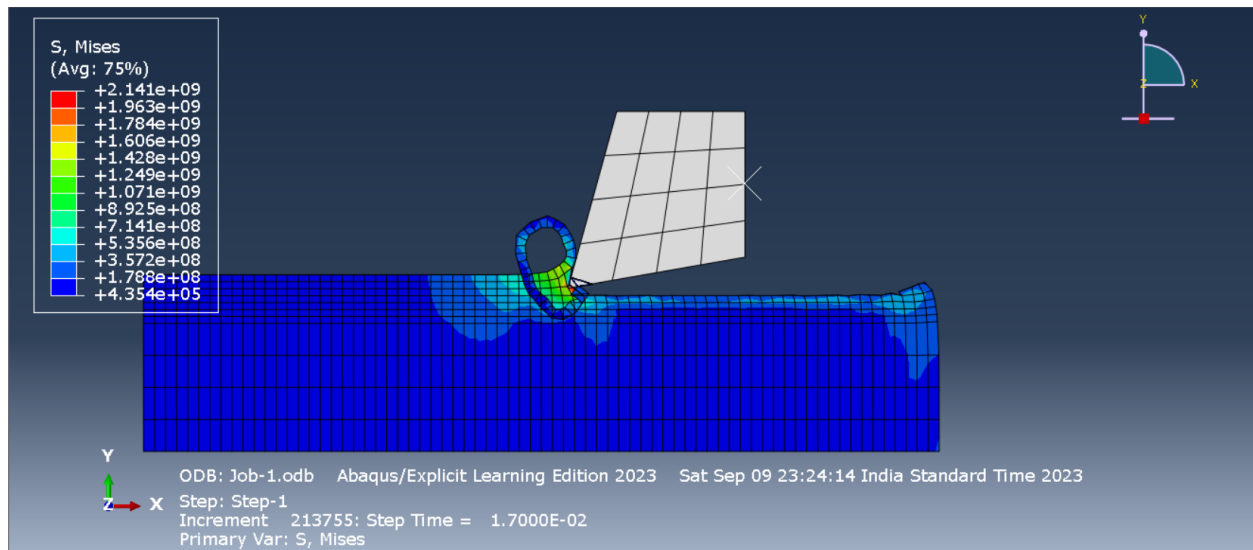


Problem statement

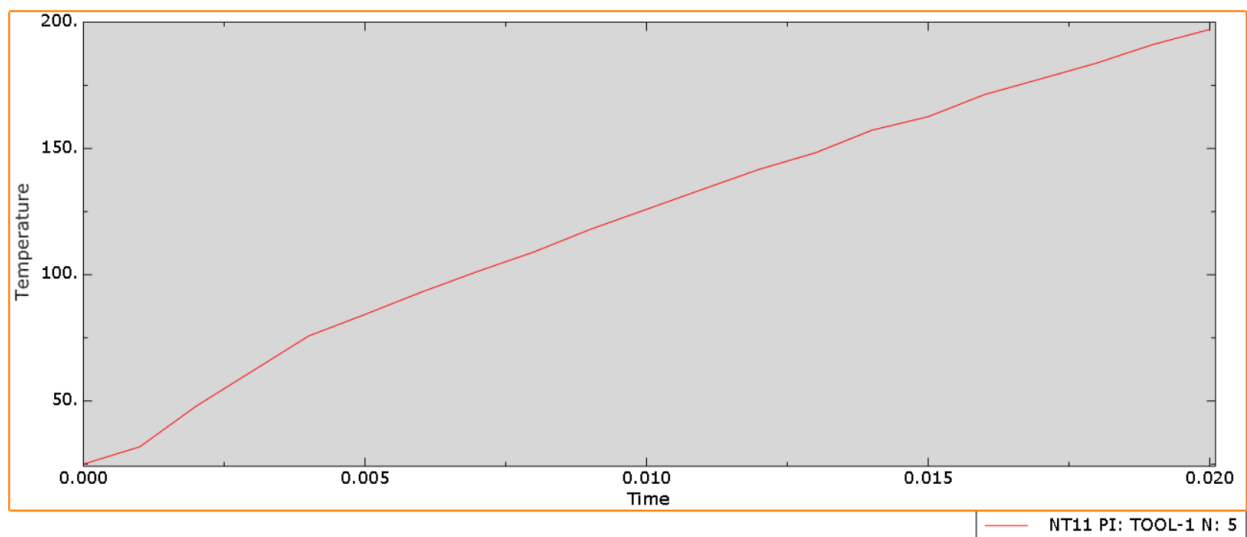
22	Inconel 718	0.5, 1, 1.5	0.3	0.2	Samay Jain
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Velocity =0.5 m/s

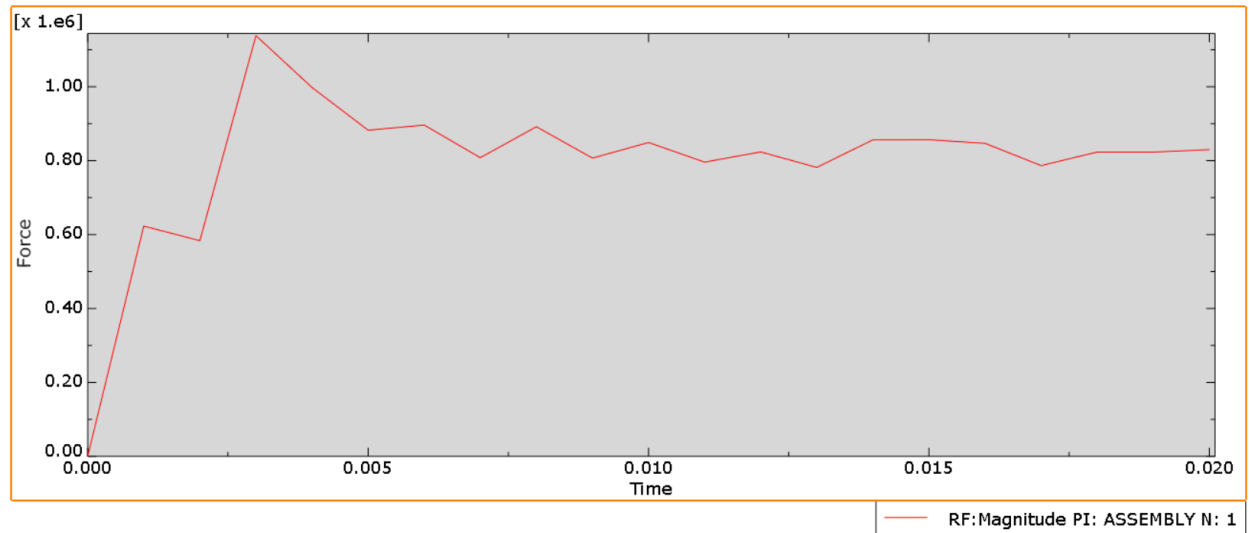
Von mises and chip formation



Temperature V/S Time of Machining at tool Tip

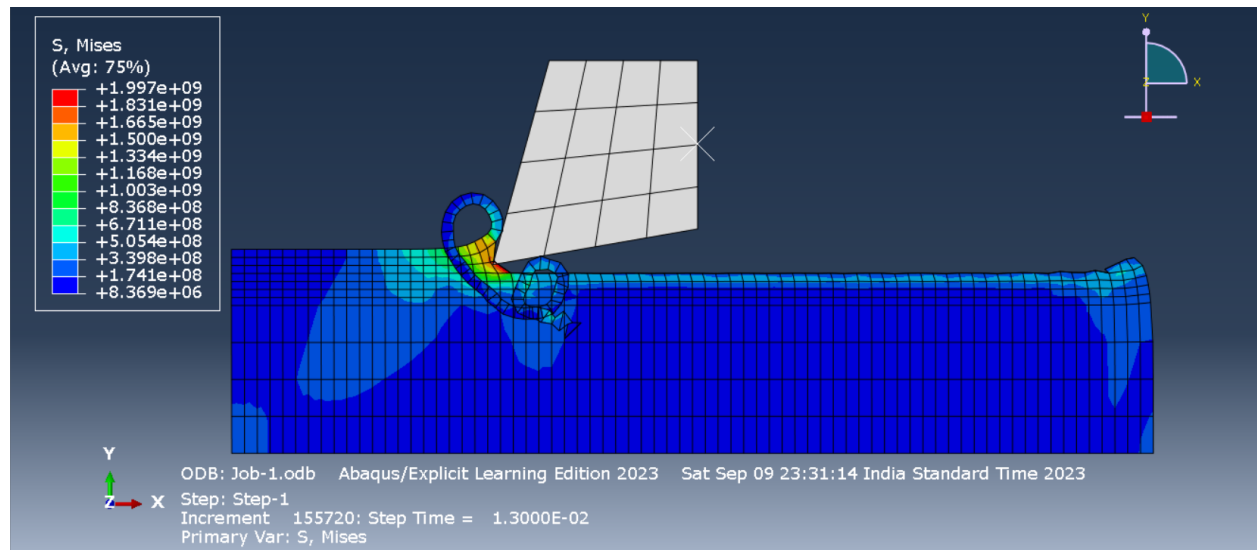


Force graph

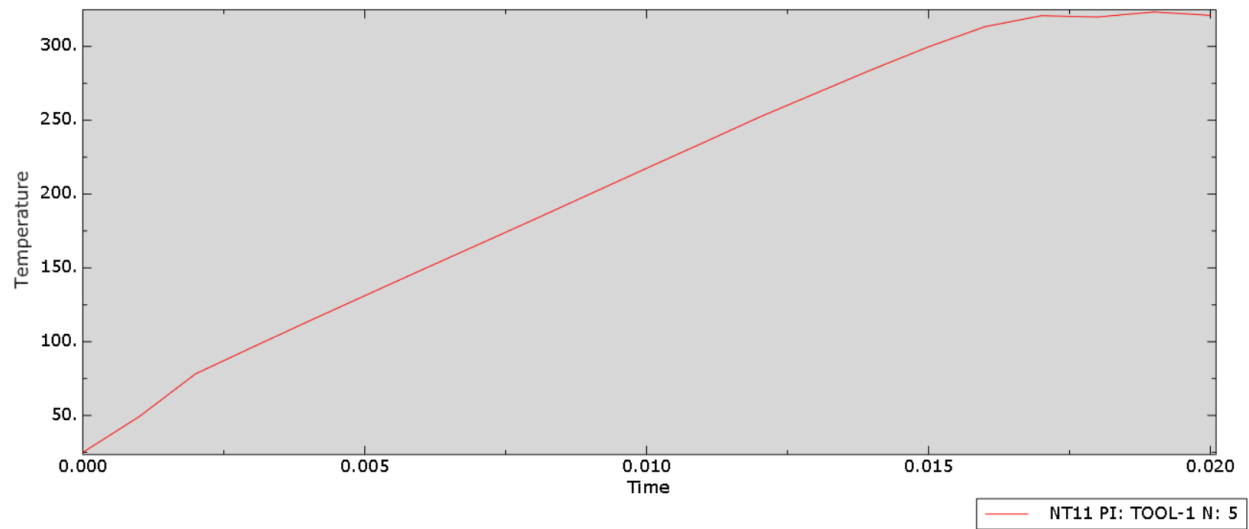


Velocity = 1m/s

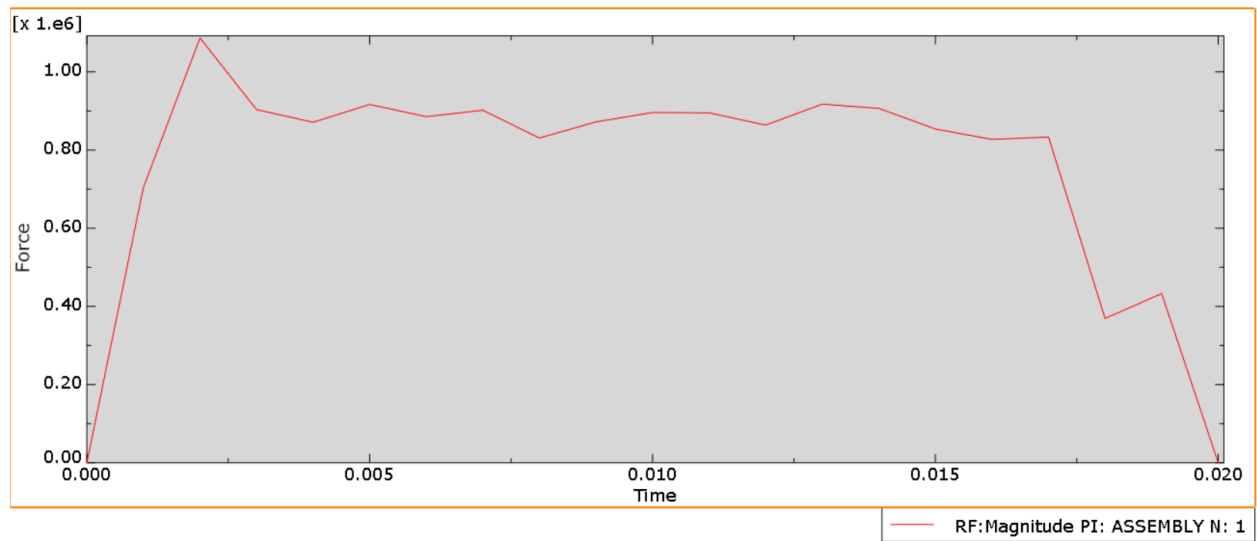
Von mises and chip formation



Temperature V/S Time of Machining at tool Tip

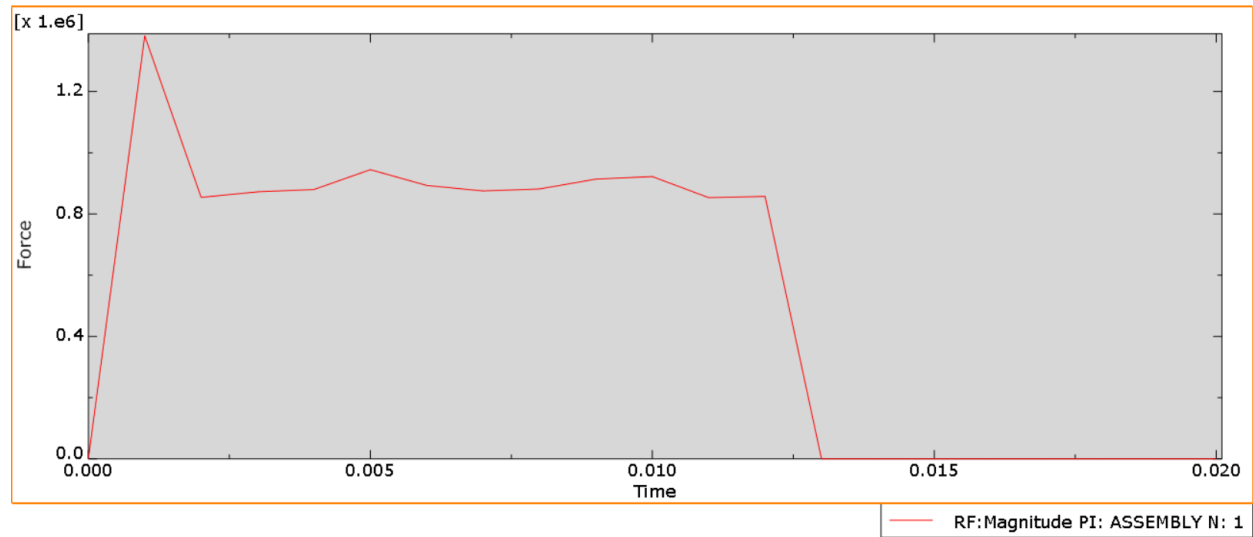


Force graph



Velocity =1.5 m/s

Von mises and chip formation



Conclusion

- Length of chips with velocity
- Power applied decrease with velocity(are under f-t graph)
- Magnitudes of temperature increase