

Aim :- Study of mechanism and morphology of chip formation under different machining (turning) conditions.

Theory :- Morphology and mode of formation of chips are quite important indices to judge machinability characteristics of any work-tool combination under given machining conditions. All parameters involved in machining play significant roles on such machinability characteristics.

Formula :-

$$\text{chip reduction coefficient } (\zeta) = \frac{a_2}{a_1}$$

$$a_1 = s \sin \phi$$

$$\tan \beta_0 = \frac{\cos \delta_0}{\zeta - \sin \delta_0}$$

$$\text{For our case } \delta_0 = 0 \Rightarrow \tan \beta_0 = \frac{1}{\zeta - 0}$$

$$\Rightarrow \boxed{\beta_0 = \tan^{-1} \left(\frac{1}{\zeta} \right)}$$

β_0 , is the shear angle.

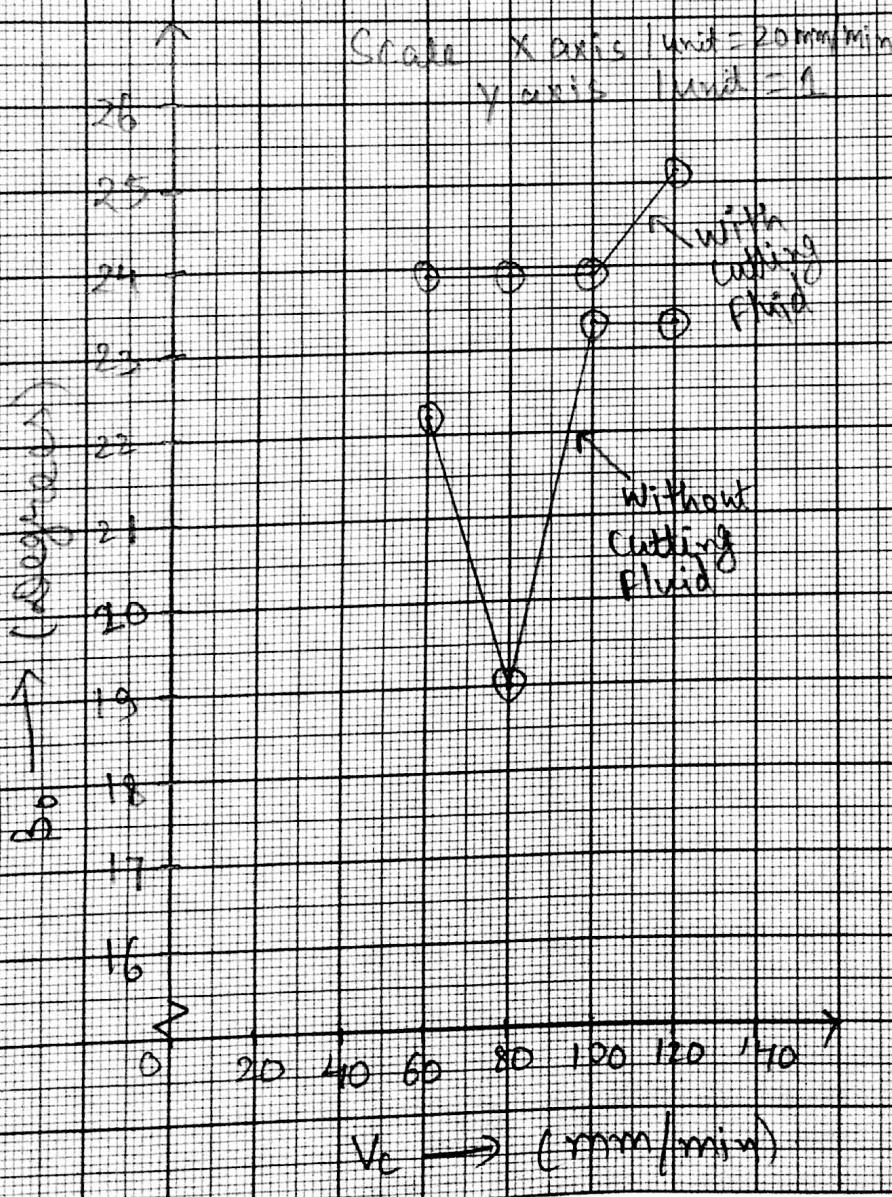
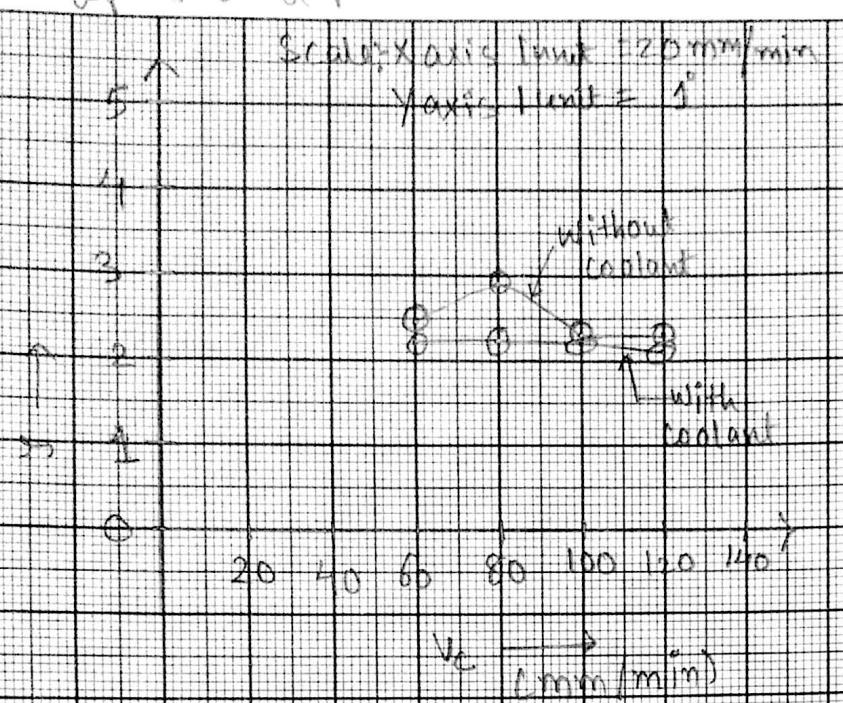
Observation Table

#	V_c m/min	N rpm	S mm/rev	Chips		a_2 (mm)	a_1 (mm)	γ	B_o
				Colour	Form				
1	60	116	0.16	Blue	Discontinuous	0.38	0.155	2.45	0.4408 22.20
2	80	154	0.16	Blue	Discontinuous	0.45	0.155	2.90	19.02
3	100	193	0.16	Blue	Discontinuous	0.36	0.155	2.32	23.32
4	120	232	0.16	Blue	Discontinuous	0.36	0.155	2.32	23.32
5	100	193	0.08	Whitish Blue	Continuous	0.33	0.077	4.29	13.12
6	100	193	0.12	Blue	Segmented	0.36	0.116	3.10	17.88
7	100	193	0.16	Blue	Discontinuous	0.36	0.155	2.32	23.32
8	100	193	0.20	Blue	Discontinuous	0.42	0.193	2.18	24.64

With Coolant

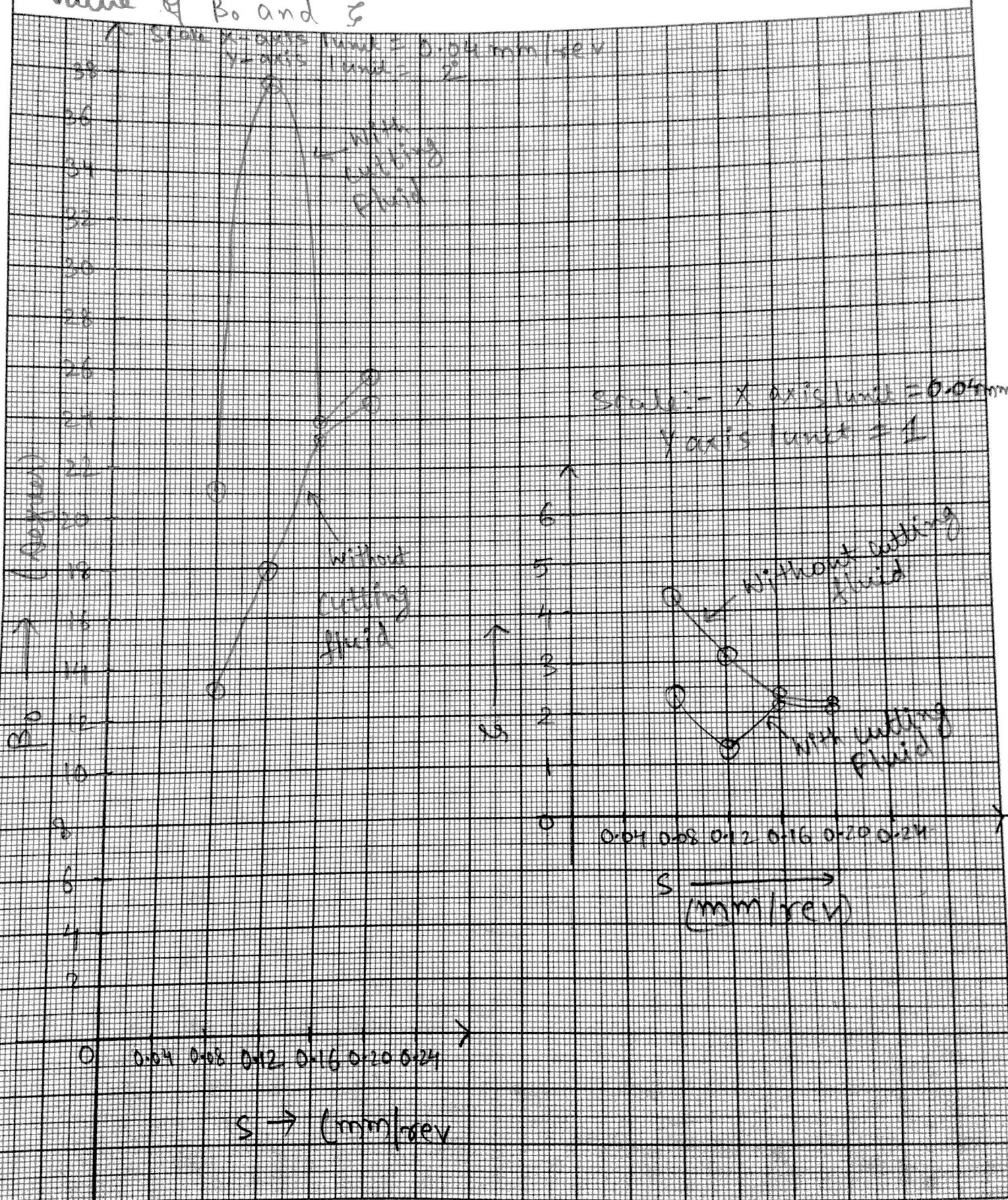
9	60	116	0.16	Silver	Discontinuous	0.35	0.155	2.26	23.87
10	80	154	0.16	Gray	Discontinuous	0.35	0.155	2.26	23.87
11	100	193	0.16	Gray	Segmented	0.35	0.155	2.26	23.87
12	120	232	0.16	Gray	Segmented	0.33	0.155	2.13	25.15
13	100	193	0.08	Gray	Continuous	0.2	0.077	2.60	21.04
14	100	193	0.12	Gray	Continuous	0.15	0.116	1.29	37.78
15	100	193	0.16	Gray	Segmented	0.35	0.155	2.26	23.87
16	100	193	0.20	Silver	Discontinuous	0.40	0.193	2.07	25.78

Effects of variation of V_c and adding Fluid application on value of I and B_o



Effects of variation of s and cutting fluid application on
value of B_0 and ζ

1) Scale X-axis's unit = 0.04 mm/rev
Y-axis limit = 2



Remarks:-

- ① The value of chip reduction coefficient (ζ) is low for all the velocities in case of straight turning with cutting fluid as compared to the case in which cutting fluid was not used.
- ② The shear angle is more for all the velocities in case of straight turning with fluid as compared to the case in which fluid was not used.
- ③ For all values of s , the chip reduction coefficient (ζ) is low for the case of straight turning with cutting fluid as compared to the case in which cutting fluid is not used.
- ④ For all values of s , the shear angle is more in case of straight turning with cutting fluid as compared to the case in which fluid was not used.