1 – Determine the shear angle in Oblique cutting can be obtained by following equation (Altintas book Eq. 2.56) by assuming that the shear velocity is collinear with shear force:

$$\tan(\emptyset_n + \beta_n) = \frac{cos\alpha_n \tan i}{\tan \eta - sin\alpha_n \tan i}$$

2- A set of orthogonal cutting test are conducted to identify the shear angle, average friction coefficient, and shear stress of P20 mold steel that has a hardness of 34Rc. The cutting conditions and measured forces and chip thicknesses are given in below table. The cutting tool was an S10 grade plunge turning tool with a zero rake angle. The width of cut (i.e. width of disk) was b=5 mm, and the cutting speed was V=240 m/min.

A) Evaluate the cutting coefficient, Ktc, and Kfc [N/mm^2] and edge forces constants Kte and Kfe [N/mm] by linear regression of the measured force.
B) Evaluate the shear angle, shear stress, and average friction coefficient for each test, and express them as a empirical function of uncut chip thickness to form an orthogonal cutting database.
C) Predict the cutting force coefficient, Ktc, and Kfc [N/mm^2] using empirically expressed shear angle, shear stress, and average friction coefficient and compare them against the values identified from mechanistic linear regression of the forces.
D) Evaluate the shear strain and strain rate for each test at the primary shear zone.

c(mm)	**Ft(N)**	**Ff(N)**	**hc(mm)**
0.02	350	290	0.06
0.03	480	350	0.058
0.04	590	400	0.074
0.05	690	440	0.083
0.06	790	480	0.102
0.07	890	505	0.116
0.08	980	540	0.131