Machine Tool and Machining Laboratory

Under Graduate Laboratory

Department of Mechanical Engineering

**Role of machining parameters on cutting forces in turning**

Objective: To study the effect of cutting velocity and feed on cutting forces in

turning steel with uncoated carbide inserts

Measurement Principle: Piezo-electric dynamometer

**Experimental Conditions:**

|  |  |
| --- | --- |
| **Item** | **Description** |
| Machine Tool |  |
| Work Material – Specification |  |
| Work Material – Composition |  |
| Cutting Tool – Specification |  |
| Cutting Tool – Geometry |  |
| Cutting Tool – Material |  |
| Dynamometer |  |
| Charge Amplifier |  |
| Machining environment | Dry |

**Procedure**

* Measure the work piece diameter and note down the available speed – feed combination
* The chosen feed may be 0.08, 0.12, 0.16 and 0.20 mm/rev and depth of cut of 2 mm
* The chosen cutting velocities are 60, 80, 100 and 120 m/min
* Conduct the experiment as per data sheet
* Measure the forces using piezo-electric dynamometer and charge amplifier

**Data Sheet**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Serial | Spindle  speed (rpm) | Cutting velocity (m/min) | Feed (mm/rev) | Px  (N) | Pz  (N) |  |
| 1. |  | 100  cutting velocity remains unchanged | 0.08 |  |  | 2.7 |
| 2. |  | 0.12 |  |  | 2.55 |
| 3. |  | 0.16 |  |  | 2.40 |
| 4. |  | 0.2 |  |  | 2.30 |
| 5. |  | 60 | 0.16  feed remains unchanged |  |  | 2.80 |
| 6. |  | 80 |  |  | 2.70 |
| 7. |  | 100 |  |  | 2.55 |
| 8. |  | 120 |  |  | 2.50 |

**Report**

Determine PXY assuming orthogonal machining, dynamic yield shear strength and specific cutting energy and show the observed and derived quantities in tabular form.

* Draw variation in PZ, PXY, dynamic yield shear strength and specific cutting energy with respect to feed and cutting velocity
* Explain nature of such variations
* Determine the ratio of main cutting force PZ to PXY. Why is it more than ‘1’?