PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Midterm Examination: Semester 1   Academic Year: 2004

Date: July 31, 2004   Time: 9:00-12:00

Subject: 226-401 Machining Technology   Room: A203

Instructions

• There are 5 + 1 bonus questions in 8 pages.

• Answer questions in the exam paper only.

• A calculator without programming capability is allowed.

• A short-note of size A4 (both sides) written in own hand-writing is allowed, and must be submitted with the answer book. (Duplicated note is not allowed)
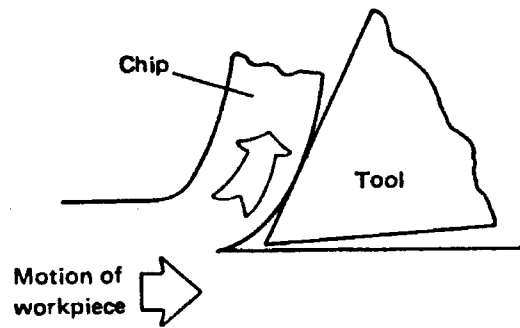
• Total score is 60 (+ 10 bonus).

Name …………………………………..   **Student ID** …………………….

Question #	Full Score	Assigned Score
1	11	
2	12	
3	12	
4	15	
5	10	
bonus	10	
Total	60 + 10 bonus	

Dr. Thanate Ratanawilai

1.   1.1 Explain heat generations in metal cutting. **(5 points)**

1.2 Explain temperature distributions in metal cutting and draw in the figure below to identify the highest temperature. **(6 points)**
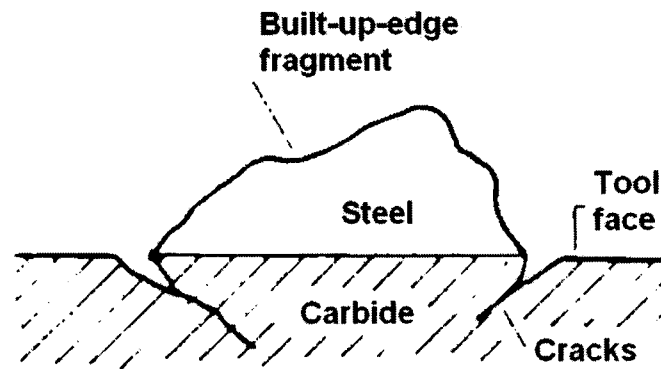
2. A machining operation is being carried out **(12 points)**

    2.1 Explain three main mechanisms of tool wear

    2.2 Explain the effects of tool wear

    2.3 From figure below, why are cracks on the tool face occurred?

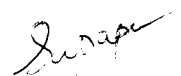**Built-up-edge fragment**

Steel

Tool face

Carbide

Cracks

3. Explain the effects of the following variables on surface roughness when an aluminium alloy is machined using high speed steel (HSS) tool. Best to draw figure along with your answer. **(12 points)**

      3.1 Cutting speed

      3.2 Feed

      3.3 Depth of cut

      3.4 Tool nose radius

4. An integral obstruction-type chip breaker has a chip-breaker height of 1 mm and a chip breaker distance of 4 mm. It is found that the chip is broken satisfactorily when the chip thickness is 0.8 mm.

What chip-breaker distance should be provided for an attached obstruction-type chip breaker to give the same performance as the integral obstruction-type chip breaker if the chip-breaker height is 2 mm and the chip-breaker wedge angle is 45^0? (Assume that the chip-tool contact length is equal to the chip thickness.) **(15 points)**

5. When cut work material A with tool X, it was found that V_{10} is 260 m/min and V_{20} is 200 m/min. **(10 points)**

      5.1   Calculate V_{60} of work material A

      5.2   If the "Machinability Rating" of work material B is 0.8 of work material A. Calculate V_{60} of material B and explain its meaning.

BONUS QUESTION (10 points)

In the single edge orthogonal machining on mild steel, the results were found as follows:

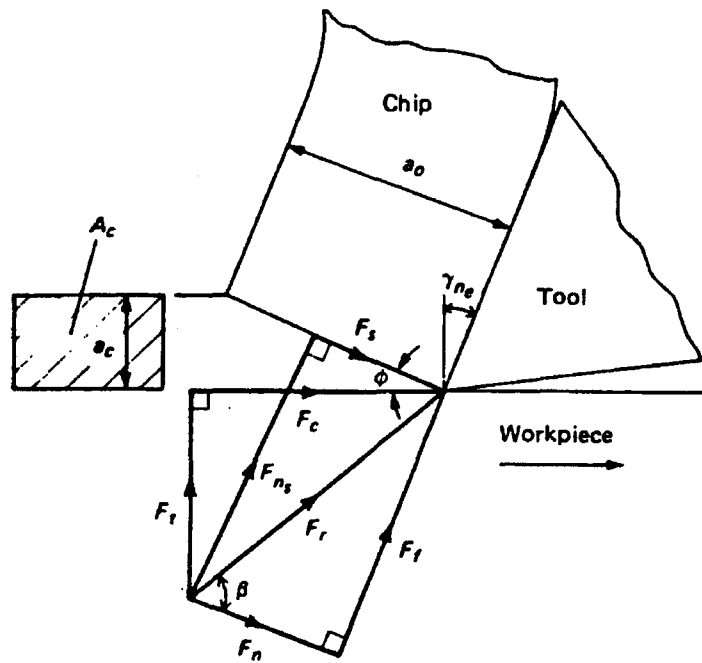Width of chip = 2.5 mm,   Undeformed chip thickness = 0.25 mm,

Chip thickness = 0.75 mm,   Working normal rake = -5°,

Cutting force = 900 N,   Thrust force = 450 N

Calculate

    1.1 The shear angle

    1.2 The mean shear strength of the work material, in meganewtons per square metre (MN/m^2)