7.99. A deep-drawing operation will take place on aluminum-killed steel with an LDR of 2.4. A cylindrical cup will be produced with a diameter of 100 mm and a sheet thickness of 2 mm. Find (a) the largest permissible blank diameter; (b) the deepest cup that can be deep drawn; (c) the deepest cup that can be drawn if LDR = 2.0. Comment on your results.

Given:

$LDR = 2.4$

punch diameter, $D_p = 100\,mm$

Sheet thickness, $t = 2\,mm$

a) largest permissible blank diameter

$$LDR < \frac{D_o}{D_p}$$

$$D_o = LDR * D_p$$

$$D_o = 2.4 * 100\,mm = 240\,mm\ *$$

b) Assuming constant thickness

Volume of blank = Volume of cup

$$\pi \frac{D_o^2}{4} t = \pi \frac{D_p^2}{4} h$$

$$h_{max} = \frac{D_o^2 * t}{D_p^2}$$

$$h_{max} = \frac{(240\,mm)^2 \times 2\,mm}{(100\,mm)^2} = 11.52\,mm\ *$$

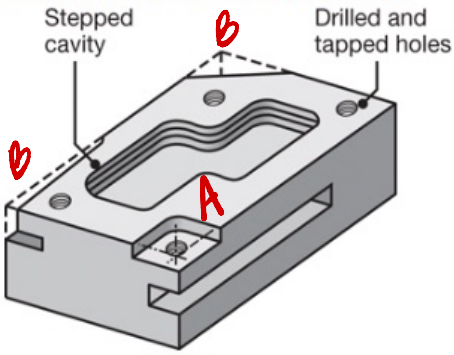
c) The deepest cup that can be drawn if LDR = 2.0

$$D_o = LDR * D_p$$

$$h_{max} = \frac{(LDR * D_p)^2 \times t}{D_p^2}$$

$$h_{max} = \frac{(2 \times 100\,mm)^2 * 2\,mm}{(100\,mm)^2} = 8.00\,mm\ *$$

8.85 The accompanying illustration shows a part that is to be machined from a rectangular blank. Suggest the type of operations required and their sequence, and specify the machine tools that are needed.



1. On a milling machine, clamp the rectangular block to secure the block.

2. Using a corner radius end mill, machine the stepped cavity and machine the step down labeled "A".

3. Using the appropriate drill bit, drill the four holes on the block

4. Using the appropriate tap, tap the four holes on the top.

5. Using a square end mill, machine the angles on the corners (label "B").

6. Using T-Slot cutter, machine the slots on the sides of the block.

9.1 Why are grinding operations necessary for parts that have been machined by other processes?

Grinding operations may be necessary for parts that have been machined by other processes in a situation where the hardness or brittleness of the material prevent future machining, or the shape is difficult to produce with to dimensional accuracy, and/or there is a particular surface finish required for the part.

9.100 Prepare a comprehensive table of the capabilities of abrasive machining processes, including the shapes of parts ground, types of machines involved, typical maximum and minimum workpiece dimensions, and production rates.

Process	Charateristics	Types of machine	Maximum workpiece dimension	Minimum workpiece dimension	Production rate
Surface grinding	This process involves the grinding of flat surfaces	Surface grinder	18" long by 6" high by 8" wide		High production rate
Cylindrical grinding	The external cylindrical surfaces and shoulders of the workpiece are ground	Roll grinder	80" diameter		
		Cylindrical grinding machine			
Internal grinding	The inside diameter of axissymmetric parts are ground	Internal grinding machine			low
		Chucking type internal grinder			
		Planetary internal grinder			
Centerless grinding	Continuously grinding cylindrical surfaces, where the workpiece is supported not by centersebut by a blade	Through-feed centerless grinding machine		0.1 mm diameter	High production rate