

# Machine Design Homework 5

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Gabe Morris

```
[1]: # Notebook Preamble
import sympy as sp
import numpy as np
import matplotlib.pyplot as plt

plt.style.use('maroon_ipynb.mplstyle')
```

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## 1 Problem 8-1

### 1.1 Given

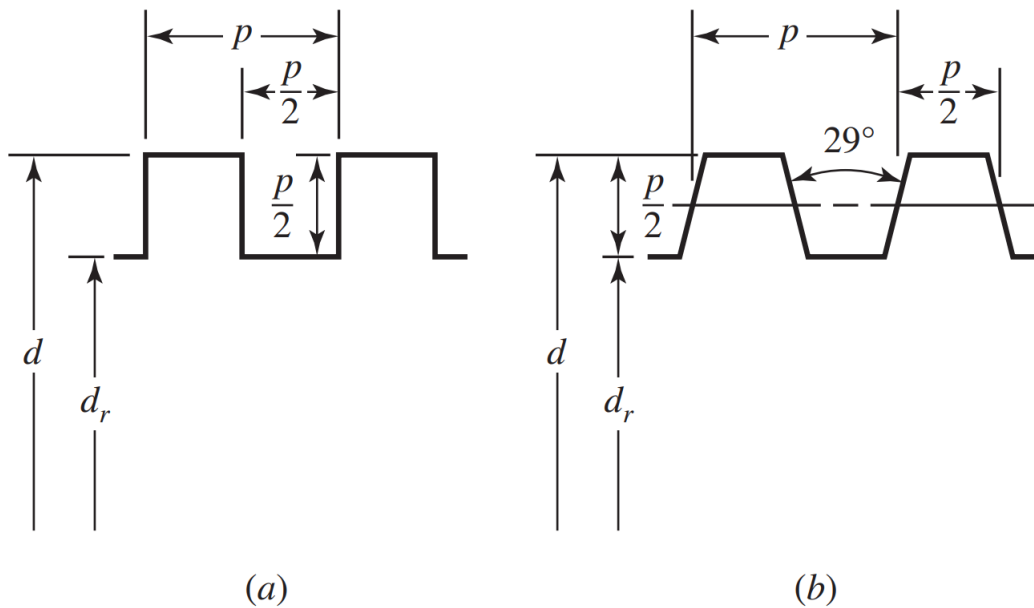
A power screw is 25 mm in diameter and has a thread pitch of 5 mm.

```
[2]: d = sp.S(25)  
p = sp.S(5)
```

### 1.2 Find

- Find the thread depth, the thread width, the mean and root diameters, and the lead, provided square threads are used.
- Repeat part (a) for Acme threads.

### 1.3 Solution



#### 1.3.1 Part A

##### Thread Depth

From (a) in the figure above, the thread depth is half the pitch.

```
[3]: # Thread depth  
thread_depth = (p/2).n()  
thread_depth # mm
```

```
[3]: 2.5
```

### Thread Width

The thread width is the same as the thread depth.

```
[4]: thread_width = thread_depth  
     thread_width # mm
```

```
[4]: 2.5
```

### Mean and Root Diameters

```
[5]: # Root diameter is the same as minor diameter  
     dr = d - 2*thread_depth  
     dr # mm
```

```
[5]: 20.0
```

```
[6]: # Mean diameter  
     dm = (d + dr)/2  
     dm # mm
```

```
[6]: 22.5
```

### Lead

```
[7]: # The lead is the same as the pitch because it's single threaded  
     l = p  
     l # mm
```

```
[7]: 5
```

### 1.3.2 Part B

The same procedure is done in Part B, but now we look at (b) in the above figure.

### Thread Depth and Thread Width

```
[8]: # The thread depth and thread width is still the same  
     thread_depth # mm
```

```
[8]: 2.5
```

```
[9]: thread_width # mm
```

```
[9]: 2.5
```

Because the thread depth is the same, so will the minor and mean diameter. The lead also remains unchanged.

### Mean Diameter, Root Diameter, and Lead

```
[10]: dm # mm
```

```
[10]: 22.5
```

```
[11]: dr # mm
```

```
[11]: 20.0
```

```
[12]: 1 # mm
```

```
[12]: 5
```