

Power Screws and Bolted Connections

ME4020 - Applied Machine Design

Mechanical Engineering

Tennessee Technological University

Power Screws

Power Screws

- Overview and Applications
- Threads for Power Transmission
- Force and Torque Analysis
- Friction and Efficiency
- Design Considerations

Overview and Applications

A power screw is a machine component that converts rotational motion into linear motion. This is necessary in variety of applications.

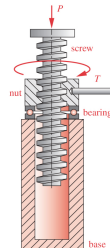


Leadscrews are used to raise and lower the front door of the Boeing 747-8F Freightier aircraft

Overview and Applications

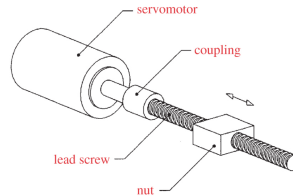
Common Applications:

- automotive jack and jack post
- machining tool positioning
- automatic doors and gates
- aircraft control surfaces
- automation/production machines



Overview and Applications

Machining Tool Positioning - 3 Axis Mill



Overview and Applications

Linear Actuator - General Purpose Machine Component



[wikipedia: animation](#)

Overview and Applications

Advantages:

- large mechanical advantage possible
- capable of lifting or moving large loads
- suitable for precision motion control
- self locking or back-drivable

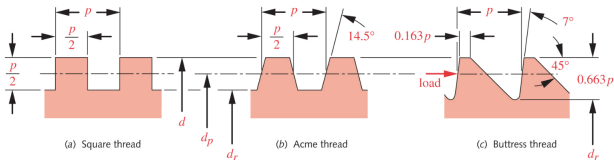
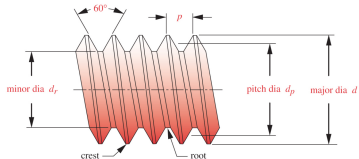
Disadvantages:

- Low Efficiency due to high friction
- High wear possible

Threads for Power Transmission

The standard thread form is not strong enough for high load applications. Many power screw applications use a square, acme, or other type of thread for power transmission.

UN and ISO Standard Thread Form



Threads for Power Transmission

Threads for Power Transmission

Force and Torque Analysis

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Friction and Efficiency

Design Considerations

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