Mechanisms

ENGR 2110

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Mechanism 1: Slider-Crank

Slider-crancks are often used to transform rotary motion into linear motion. (Rotational to Translational)
In-Line Slider Crank

The In-Line mechanism has a stroke equal to twice the crank length.

The crank dictates the extreme positions of the slider along rotation.

Max Extreme when $\theta = 0^\circ$

Min Extreme when $\theta = 180^\circ$
Offset Slider Crank
Linkage

- (1) Frame
- (2) Input Link (Crank)
- (3) Coupler Link
- (4) Output Link

Pin support connections to allow rotational motion transfer to transverse motion.
Slider Crank Applications

- The slider crank mechanism can be seen in a cutaway of an internally combustible engine; two slider crank mechanisms in the form of pistons, connecting to rods and cranks. The application to perhaps a billion internal combustion engines makes the slider-crank mechanism one of the most utilized mechanisms.
Slider Crank Applications
Slider Crank Applications
Mechanism 2: Spur Gear
Slider Crank Animation
What is a spur gear?

• Spur gears are the most common and simplest gears found.
• Teeth are straight and parallel to the shaft running through the gear.
• Spur gears essentially only transmit power and rotation from one axis to another.
Background

• Antique Apple Peeler
  – Graduated spur gears in parallel are used in this device to increase the apple’s angular velocity allowing it to be peeled faster by the device
Uses

• Used in combination with other spur gears to create large gear reductions.
  – also known as converting speed to torque
• Some common products that have spur gears
  – Electric Screwdriver
  – Oscillating Yard Sprinkler
  – Windup clock
  – Clothes dryer
  – Cranes & hoists
  – Machine tools
  – Conveyers
Examples
Pros & Cons

• Pros
  – Perfect for transmitting power or rotation between parallel axis
  – No axial forces generated
  – Cost effective and easy to buy and manufacture
  – Economical

• Cons
  – Loud when teeth make contact during rotation
  – Due to parallel alignment with shaft, increased stress on the spur gear teeth when they make contact during rotation
The purpose of a Double-Slider Mechanism is to result in two output motions from a single input motion.
Double-Slider
Scotch Yoke Engine

Two Stroke Scotch Yoke Engine is a mechanism that converts the linear motion from a slider, which is being driven by the pistons, into both rotational motion of the pin and linear motion pin, which acts perpendicular to the input motion.
Double Slider Application

• Four Stroke Trammel Engine - a mechanism that converts the linear motion from the two sliders, which are driven by the pistons, into rotational motion.
Websites Consulted

- www.engr.sjsu.edu/~mae/faculty/.../mechanisms/mechanisms-new.ppt