

Project Overview

Design of Power Transmission

Project Goals

- Bring together the individual components of a mechanical, gear type power transmission into a unified complete system.
- Establish reasonable tolerances and limit dimensions on key dimensions of components.
- Verify that the final design is safe and suitable for its intended purpose.
- Add details to some of the components that were not considered in earlier analysis

Description

- Design a power transmission for an industrial saw that will be used to cut tubing for vehicle exhaust pipes to length prior to the forming process. The saw will receive 10 hp from the shaft of an electric motor rotating at 1750 rpm. The drive shaft for the saw should rotate at approximately 500 rpm.

FOR MORE INFO:

www.winsmith.com

Machinery's Handbook, 26th Edition

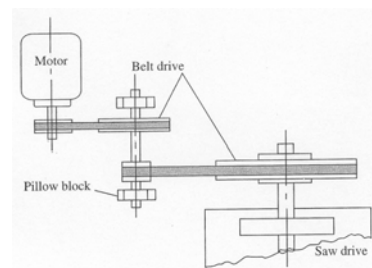
Project Analysis

- **Functions**
 - (the basic functions expected of a power transmission)
- **Design Requirements**
 - Add specific information for this project
- **Selection criteria**
 - To be used for this project elements

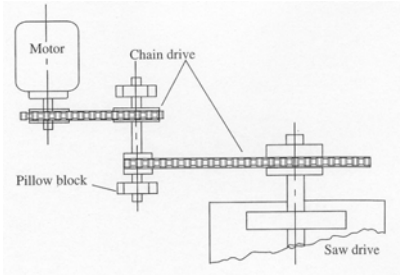
Design Alternatives

- **There are many ways in which the speed reduction can be accomplished**
- **Decision Analysis**
 - Safety
 - Cost
 - Size
 - Reliability
 - Maintainability
 - Smoothness

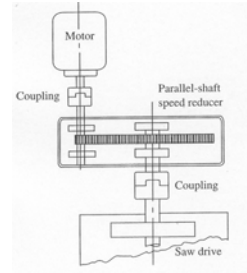
Belt drive



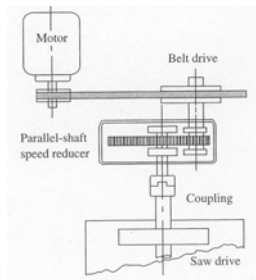
Chain Drive



Single Stage Gear Reducer



Belt drive with Single Stage Gear Reducer



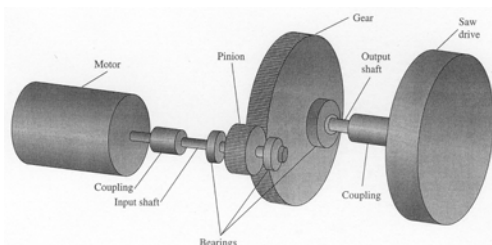
Design Alternatives

- Single reduction spur gears
- Single reduction helical gears
- Bevel gears
- Worm gear drive

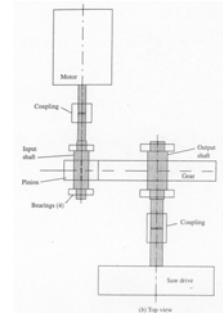
FOR MORE INFO...

See Chapter 11 to 13 of Textbook

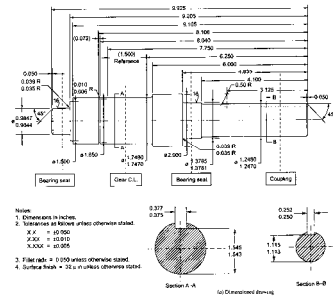
Pictorial view of Single Stage Gear Reducer



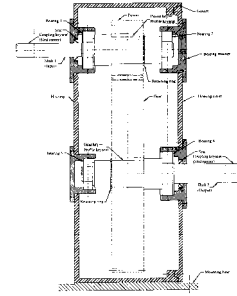
General Layout of Single Stage Gear Reducer



Output shaft



Assembly Drawing



Steps in Project

- **Motor frame size (see Table 9.3, p 187)**
 - 215T for 10 hp
 - Shaft size
 - 1.375 in
 - Keyway size
 - 5/16 in X 5/32 in

Steps in Project

- **Gear design (Chapter 11 to 13)**
 - Use the gear design procedure given
 - Specify the assumptions and the values chosen
 - Sizes depend on the material chosen. 3.5 in and 12.25 in with a diametral pitch of 8, Face width = 2 in.

Steps in Project

- **Shaft (input and output) design (Chapter 17)**
 - Get the forces and torque
 - Calculate shear force and bending moment
 - Take the combined effects into account
 - Select a proper material
 - Check the critical speed
 - 1.5 to 2 in dia

Steps in Project

- **Bearing selection (Chapter 20)**
 - Calculate the life of the bearings
 - Select identical bearings for both ends
 - http://www.skf.com/portal/skf_us/
- **Coupling selection (Chapter 15 and Internet)**
- **Keys and key seat design (Chapter 15)**
- **Housing**
 - General arrangement of all the components

<https://sdp-si.com/eStore/>

Description
Endless Coupling, 0.375in. Bore, 2in. Overall Length, Material: Brass/Pin Hub.



Product Details

Part Number 55K89-HTA1612	Quantity	Price
Unit Each	1 to 9	\$72.01
Bore Size 0.375in W/1/8 (Keyway)	10 to 24	\$62.35
Overall Length (L) 2.000"	25 to 49	\$58.38
Hub	Higher quantities	
(Mat'l/Coating) Brass/Pin Hub	Availability In Stock	
(Mat'l/Coating) Polished Brass	Sell Unit Each	
Hub Dia. 1.187"	Quantity	
Bore Dia. (O.D.) 1.562"	<input type="text"/>	<input type="button" value="ADD TO CART"/>
Max. Torque 100.0 lb-in	<input type="button" value="ADD TO BIDS"/>	
Max. Speed 2000 RPM		
Lateral Offset 0.010"		
Angular Offset 1.0°		

CAD Models / Catalog Pages

Specs from printed catalog	pdf
PTE PartLink	3D CAD
	Model

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