**Project Overview**

Design of Power Transmission

**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.

**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.

**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**

FOR MORE INFO

www.winsmith.com
Machinery’s Handbook, 26th Edition
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
Schedule

- Overall stages in the project

![Schedule diagram](image)

Output shaft

![Output shaft diagram](image)

Input shaft

![Input shaft diagram](image)
Output shaft

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

- **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

- **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.

- **Bearing selection (Chapter 20)**
  - Calculate the life of the bearings
  - Select identical bearings for both ends

- **Coupling selection (Chapter 15 and Internet)**

- **Keys and key seat design (Chapter 15)**

- **Housing**
  - General arrangement of all the components