



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution



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DEPARTMENT OF MECHANICAL ENGINEERING

19MET303– DESIGN OF Transmission System

III YEAR VISEM

UNIT 1– Design of Flexible Transmission Elements

TOPIC :Chain Drive

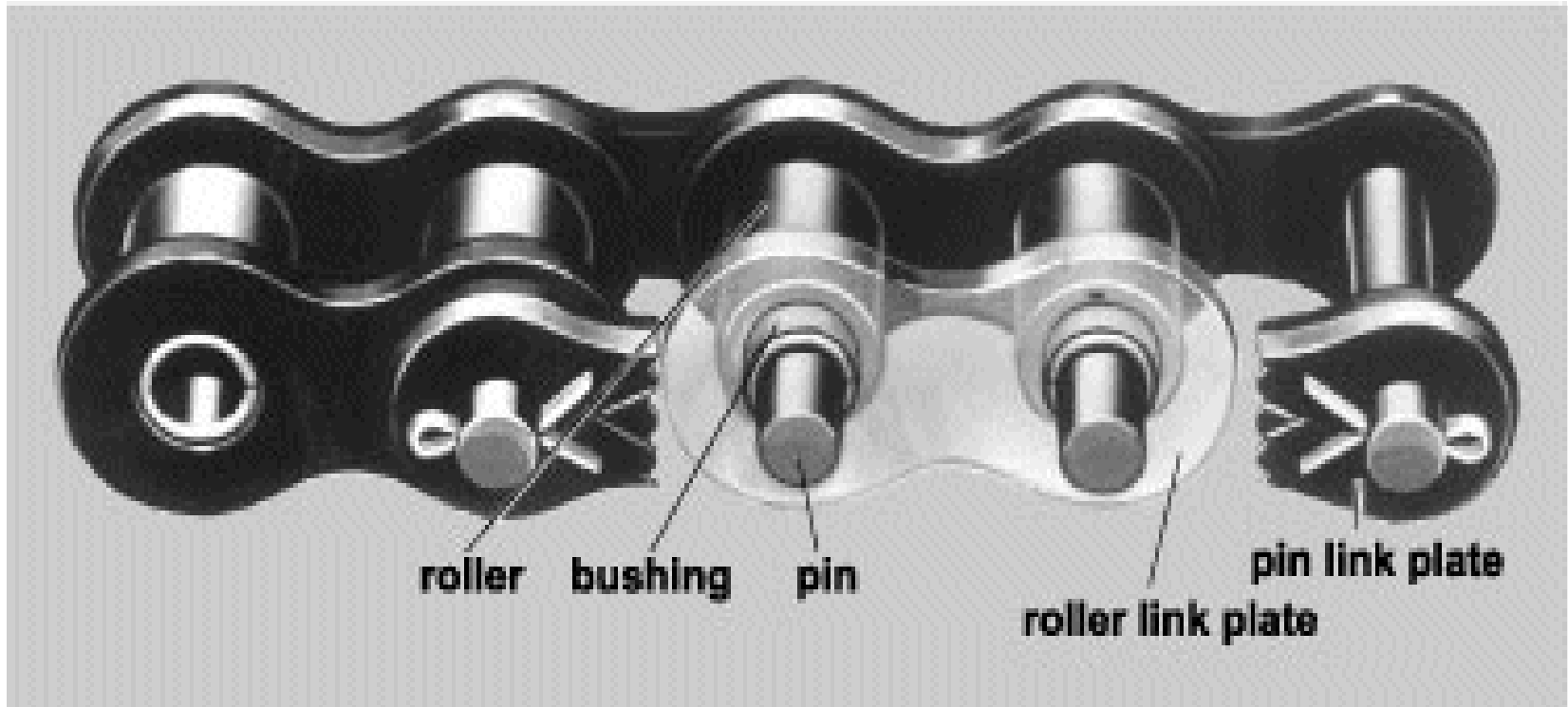


Introduction of chain drives

- ✓ Chain drives are used to transmit power between two parallel shafts comparatively at a longer distance
- ✓ Simple chain drive consists of two sprockets and an endless chain
- ✓ Small sprocket is called pinion and larger sprocket is called wheel
- ✓ Sprockets are the toothed wheel of special profile for teeth
- ✓ Some chain drives idler are used as tensioning device.
- ✓ The chain is made up of links , pins and bearings.
- ✓ The material used for the chain is a high grade steel with the pins and bushings

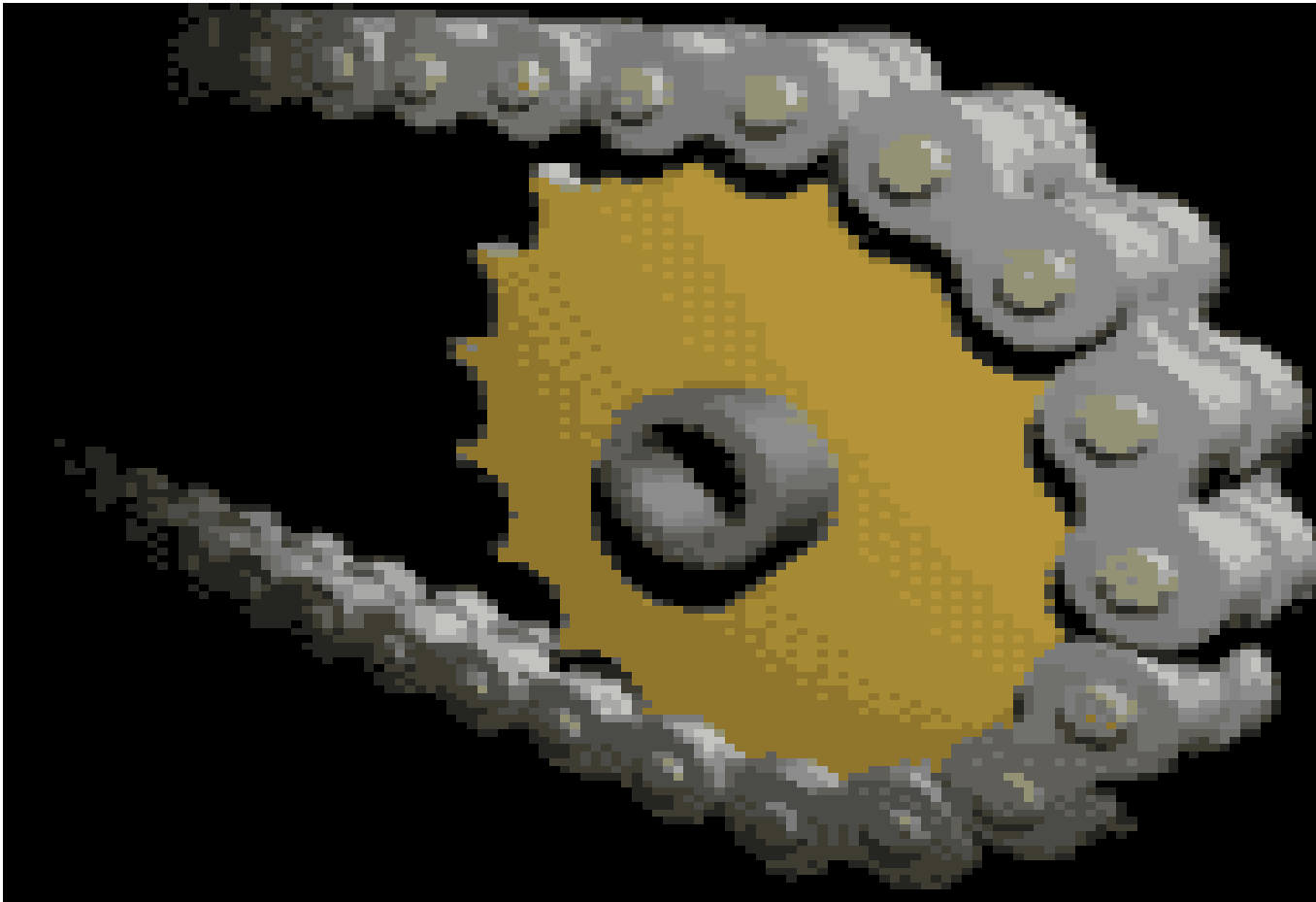


Chain Elements





Chain with Sprocket





Advantages of chain drives

- ✓ Chain drives can be used for long as well as short centre distances.
- ✓ It is suitable for medium centre distances where gear drives require idler gears.
- ✓ Chain drives are positive drives compared to the belt drive but not suitable where precise motion is required due to wear in the bushings, pins and sprockets.
- ✓ One chain can be arranged to drive many units.
- ✓ Efficiency is very high (98%) and require low maintenance cost if properly lubricated.
- ✓ Transmit more power , occupy less space and compact
- ✓ It can be operated under adverse temperature and atmospheric conditions
- ✓ It do not exert high pressure on the shafts and bearings.
- ✓ High speed ratio of 8 to 10 in one step.

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Disadvantages and of chain drives

- ✓ Good alignment of shafts is required especially for high speed chains and wide chains.
- ✓ Cost is very high

Applications

Bicycles,
motor cycles,
textile machinery,
material handling machines,



Failure of chain drives

1. The chain elongation

- ❖ it is caused by increased pitch due to joint wear under the action of tension and dynamic loads during operation
- ❖ Due to wear, the pitch increases and it fails to match the sprocket teeth and may run off the sprockets,
- ❖ Chain elongation should be restricted to 3%

2. Failure of joints and plates

- ❖ Under dynamic loads and repeated loads pitting occurs at the surface of rollers and bushes.
- ❖ This results in surface roughness to produce more dynamic load.
- ❖ Strong knocks occurs some times even split the rollers and bushes.
- ❖ Wear in sprockets occur due to relative motion between the bush and teeth.
- ❖ The wear depends on profile of the teeth and manufacturing accuracy.
- ❖ Improper erection causes misalignment of sprockets and wear occurs on the plate of the chain as it bears with the sprockets.

3. Wear of the sprocket teeth



Design Procedure for chain drives

- ✓ **Select the type of chain -- Roller , Bush, silent or other type, depending on the use , velocity ratio.**
- ✓ **Determine the design power = rated power X Service factor.**
- ✓ **Fix up the chain number of strands for the design power and pinion rpm.**
- ✓ **Note down the parameters of the chain namely pitch, width, weight per unit length, braking load,**
- ✓ **Select the number of teeth Z_1 depending on the velocity ratio and determine the pitch circle diameter of the sprocket pinion D**
- ✓ **Find the pitch line velocity**
- ✓ **Determine the load on the chain**
- ✓ **Determine the factor of safety , this should not be the values of the given in standard table.**
- ✓ **Calculate the bending of the stress on the roller and check for the permissible value**
- ✓ **Fix the length of chain from the centre distance and correct it to the nearest even pitch**
- ✓ **Correct the center distance for the corrected length of chain and give allowance for sag**
- ✓ **Check for the actual factor of safety.**

