To use spur gears as intermediate power transmission.

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***Abstract*—This study has been undertaken to reduce capacity of the main gear box by introducing a pair of spur gears and also to provide extra support for system rigidity.**

This is an useful aspect in engineering for designing high capacity horizontal Blenders to balance eccentric load during the blending process.

I. Introduction

Worm reduction gear box & bevel helical gear boxes are widely used in industry. Usually gear box capacity is defined based on torque generated by eccentric load.

Gear box capacity can be reduced upto a limit by incorporating a pair of spur gears along with main gear box.
The basic concern of the study is what would be the minimum size of spur gears & how it's to be calculated with respect to the main gear box.

II. NEED OF THE STUDY

Technical calculations play a significant role in machine performance. So from a design perspective it should be made simpler and full proof.

Over design leading to a bulky system with high energy consumption & high initial cost.
Accuracy in design calculations provides system rigidity & better life cycle.

We shall discuss a blender having a main gear box along with an intermediate pair of spur gears designed for a particular load & rpm.

Step 1 : Power Calculation :

Gear Boxes are selected based on two aspects a) Torque b) Gear box ratio.

Torque is defined as Newton-Meter (or kg-m) & Ratio is based on required output rpm.

Let us consider W kg to rotate @ N rpm , and radius of rotation is R meter.

Torque (T): WxR kg-m

Input Power required: HP (P)=(2x3.14xNxT)÷(75×60)

Step 2 Gear Box selection :

Let's consider motor RPM - n & selected gear box ratio-r

n ÷ r = 2 N

So gear box is selected as the torque T/2 kg-m & Ratio-r

Step 3 Selection of spur gears :

Let us consider D is diameter(pcd) of spur gear & d is the pinion diameter.

Now to select ratio of gear to pinion D/d =2 to get final rpm as N.

Now output torque is also increased to double after spur gears.

So we achieved rated torque T kg-m.

Step 4 To calculate pcd of spur gear (D) :

From step 2 , the torque of the main gear box is T/2 kg-m.

Torque to be generated from spur gears (T-T/2) kg-m = T/2 kg-m.

Total load to rotate is W kg. The system is simply supported. So load on spur gears is W/2 kg. It's a radial load.

The tangential component of the load is W/2tan20 =w kg let us say. Where 20 deg is pressure angle of gears.

Now D/2 × w = T/2

D (in meter) can be easily calculated from the equation & this pcd of spur gear.

Then pcd of pinion is d = D/2 meter

III. Theoretical framework

Variables with theory based on extensive study of different types of gears in various applications in terms of energy savings & simpler design.

IV. RESEARCH METHODOLOGY

It is based on observations over various projects & applied at different projects as per requirements.

The above mentioned principle is applied in horizontal & vertical blenders , mixers etc.

V. Conclusion

1. Size of spur gears depends on the capacity of the main gear box. Size increases as capacity is reduced.
2. Spur gears provide extra support to the system.
3. Spur gears enable the system to work with reduced capacity main gear box which has an impact on initial cost.