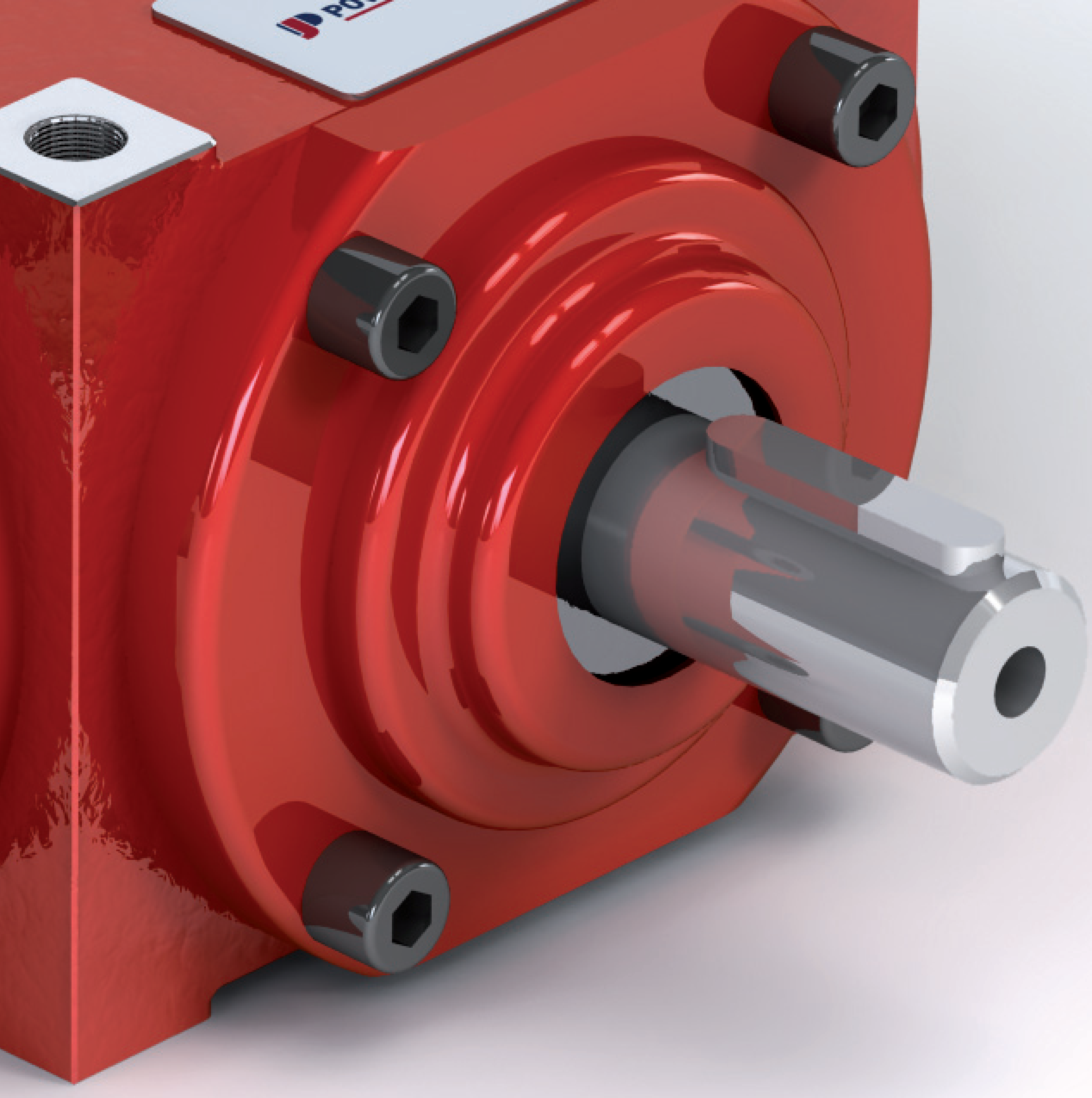


GEARBOX SELECTION

15 Step Guide

POWER JACKS

4.2.2 Bevel Gearbox Selection with Example

4.2.2.2 How to Select a Neeter Drive Unit

When selecting a gearbox, there are a number of factors which can influence the final size of unit selected. The information contained in the selections gearbox characteristics (4.2.1) and Technical data (4.2.3) provide details of these factors for use in the selection process.

The following Selection Procedure provides a step-by-step guide to gearbox selection for those not fully familiar with the procedures. An example has been used in the selection procedure to assist in following through the procedure.

Example Unit

A gearbox is required for an Input Speed of 1000 rpm, an Output Speed of 500 rpm, an Output Torque of 150Nm and one Output Shaft. The Drive is by electric motor through a clutch mechanism and the gearbox is on the main drive of a heavy duty stacking machine. The machine operates for 10 hours per day, starts 8 times per hour and operates for 35 minutes in every hour, the other 25 minutes being taken up in loading the machine. The ambient temperature of the premises is 20°C.

Specified Information	Example Specified Information
1. Gearbox Input Speed (rpm)	1000
2. Gearbox Output Speed (rpm)	500
3. Gearbox Configuration (refer Section 4.2.5.)	2 Way (2)
4. Required Output Torque (Nm)	150
5. Operating Hours per Day (refer Section 4.2.3.)	10
6. Input Power Source (refer shock load table)	Electric Motor
7. Gearbox Application (refer shock load table)	Stacking Machine
8. Number of Starts per Hour (refer Section 4.2.3.3.)	8
9. Transmission Methods (refer transmission mechanism, Section 4.2.3.5.)	Clutch
10. Duty Cycle per Hour (% Running time)	35/60 = 58%
11. Operating Ambient Temperature (refer Thermal Limit, Section 4.2.3.6.)	20

4.2.2.3 Selection of Design Factors

Selection of Design Factors	Example Design Factors
Step 1 - Shock Load Factor (f_1) Using the Specified Information in Points 5, 6 and 7 above, select the Shock Load Factor from the Table in Section 4.2.3.2	1.50
Step 2 - Starting Frequency Factor (f_2) Using the Specified Information in Point 8 above, select the Starting Frequency Factor from the Table in Section 4.2.3.3	1.00
Step 3 - Transmission Load Factor (f_3) Using the Specified Information in Point 9 above, select the Transmission Load Factor from the Table in Section 4.2.3.4	1.00
Step 4 - Thermal Limit - Duty Cycle - Factor (f_4) Using the Specified Information in Point 10 above, select the Thermal Limit - Duty Cycle - Factor from the Table in Section 4.2.3.6.1	1.25
Step 5 - Thermal Limit- Ambient Temperature - Factor (f_5) Using the Specified Information in Point 11 above, select the Thermal Limit - Ambient Temperature -Factor from the Table in Section 4.2.3.6.2	1.00

4.2.2 Bevel Gearbox Selection with Example

4.2.2.3 Calculated Data

Example Calculated Data

Step 6 - Calculate the Gear Ratio
Input Speed ÷ Output Speed
Note: If the gear ratio does not correspond to one of the STANDARD ratios contained in this technical manual, one of the speeds, normally the output speed, must be changed to bring the ratio to standard. Non-standard ratios can be supplied, if required, but such special selections must be referred to Neeter Drive.

1000/500 = 2
Therefore 2:1 Reduction

Step 7 - Calculate the Corrected Output Torque
Required Output Torque x f_1 x f_2 x f_3
Note: Where there is more than one output shaft, the Required Output Torque for the gearbox is the summation of the individual Output Torques from the output shafts.

150 x 1.25 x 1.00 x 1.00 x = 187.5 Nm

Step 8 - Calculate the Corrected Output Power
Required Output Torque x Output Speed ÷ 9550

(187.5 x 500) ÷ 9550 = 9.82 kW

Step 9 - Calculate the Input Power Output Power ÷ Efficiency
(Gearbox efficiency is between 95% and 98% after initial running in).

9.82 ÷ 0.98 = 10.02 kW

4.2.2.4 Gearbox Selection

Example Gearbox Selection

Step 10 - From the GEARBOX RATINGS TABLE, select the gearbox with the closest adequate rated power.

From the Selection Table in Section 4.2.4., for Input Power 10.02 kW, gear ratio 2:1, Output Torque 315 Nm and Input Speed 1000 rpm, select Series 39.

Step 11 - When selecting a gearbox, the Thermal Capacity of the gearbox chosen must be considered. For the Limiting Thermal Capacity, expressed as a Power Rating, refer to Section 4.2.3.6.3.
For the selected gearbox, calculate the Thermal Capacity = Limiting Thermal Capacity x f_4 x f_5.
The Calculated Input Power must not exceed this Calculated Thermal Capacity. A larger gearbox must be selected if the Calculated Input Power is higher and a check run on the other parameters.

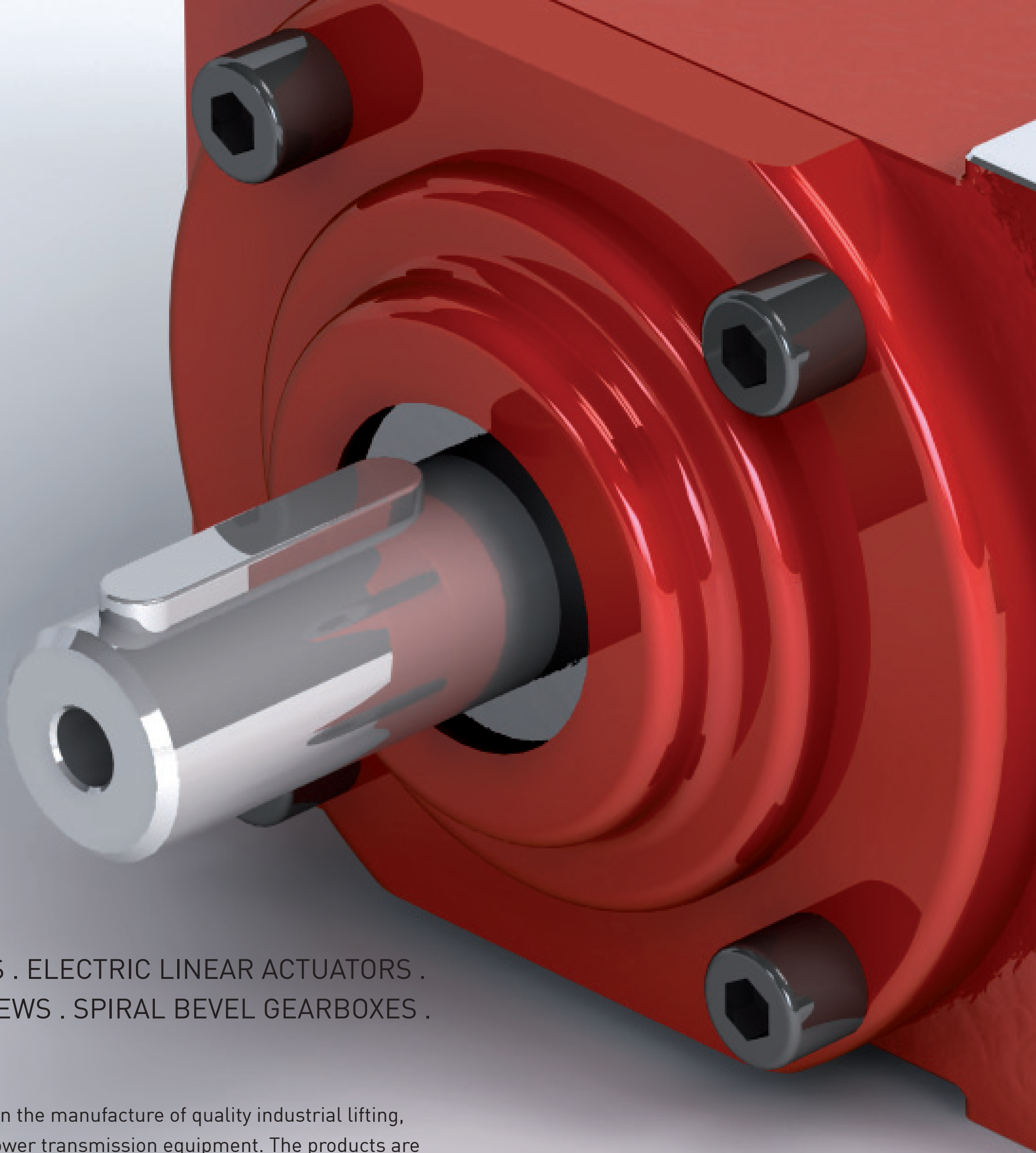
From the table in Section 4.2.3.6.3, Limiting Thermal Capacity for Series 39 is 49kW.

Calculate the gearbox,
Thermal Capacity = 49 x 1.25 x 1.00 = 73.5 kW

The Input Power is within this limit. Selected gearbox is OK.

Step 12 - As a final check on the capacity of the chosen gearbox, the effect of the connected drive systems must be considered. The section headed Permissible Shaft Loading describes the calculation to be undertaken where the transmission mechanism can give rise to radial and/or axial forces on the gear shafts. This occurs, particularly, where chain and belt drives are employed.

Power transmission is by clutch. From the Transmission Load Factor table (refer Section 4.2.3.5), there are no additional loads to be considered and the selection of gearbox is acceptable.



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