FEATURES OF JENA-TEC PRECISION LEADSCREWS

ACCURACY, QUALITY & RELIABILITY: JENA-TEC continue to service customers who prefer to use traditional leadscrews. The JTPL and JTRL range of leadscrews are manufactured with the same precision, experience and standards of release applied to ballscrew products.

AVAILABILITY: A range of precision leadscrews in metric and inch sizes in single and multi-start, standard leads, with nuts in various materials, to suit application, are available either directly from inventory or on a short delivery from our manufacturing base.

LEADSCREW DRIVE OPTIONS:

- Single start threads
- Multi start threads
- Trapezoidal & acme threads
- Steel, Grey Iron & Phosphor bronze nuts
- Gunmetal & plastic nuts for high speed low noise operation
- Special threadforms by request

Note: Trapezoidal thread spindles with pitch angles of less than 2.5˚ can be considered self locking.

JENA-TEC LEADSCREW RANGE DETAILS:

JTpL Range: A range of high precision ground and whirled leadscrews and nuts manufactured in a range of threadforms to customer requirements.

JTrL Range: A range of precision rolled trapezoidal screws in single and multi-start configurations with optional nut materials.

A selection of some of the many thread forms available in rolled, milled, whirled and ground formats in both metric and inch sizes.

END FEATURES AND NUTS

End features and nuts are produced to meet customer requirements. Splines, keyways, fine threads, trunnions, gear forms and ground diameters are a few of the features regularly supplied.

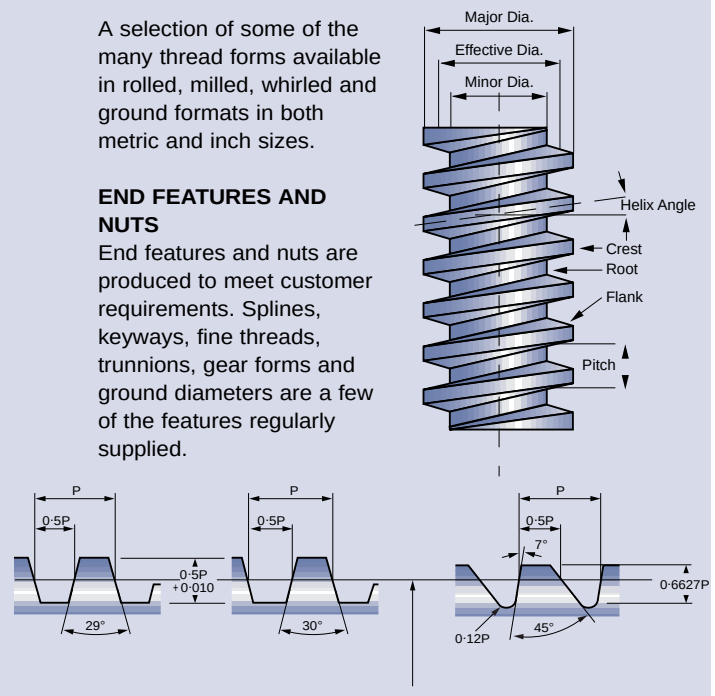

FIG. 12

DESIGN CONSIDERATIONS LEADSCREWS:

LOAD RATING: The load rating of leadscrews is dependent, as a general principle, on the material used, surface quality, state of wear, surface pressure, lubrication conditions, running speed and temperature, and thus on the duty cycle and provision for heat dissipation.

The permissible surface pressure is dependent on the running speed of the screw drive.

With motion drives the surface pressure should not exceed 10 - 15N/mm².

The pv values specified for the nut material and the bearing surface provide a simple method of calculating the permissible running speed.

Example:

Load = 10000N

$$\text{Required bearing surface} = \frac{10000\text{N}}{10\text{N/mm}^2} = 1000\ \text{mm}^2$$

$$\text{pv value of Gunmetal} = 300\text{N/mm}^2 \cdot \text{m/min}$$

$$\text{Permissible surface running speed} = \frac{300\text{N/mm}^2 \cdot \text{m/min}}{10\text{N/mm}^2} = 30\text{m/min}$$

If this speed is too low, a larger spindle must be selected to obtain a larger bearing surface.
The permissible running speed can now be used to calculate the spindle speed; which in turn can be used together with the spindle pitch to calculate the feed speed.

Feed speed = Speed x lead

CRITICAL SPEED OF LEADSCREW SPINDLES:
The comments and calculations for establishing the maximum permissible spindle speed are the same as for ballscrews (see page 28/29). The theoretical critical speed can be taken from Fig 8 page 28/29.

BUCKLING FORCE LEADSCREW SPINDLES:
The comments and method of calculation for establishing the buckling force are the same as those used for ballscrews (see page 31). The theoretical critical buckling force can be taken from Fig 9 page 30.

DRIVING TORQUE REQUIREMENTS/ INSTALLATION AND MAINTENANCE:

The required torque for a leadscrew drive (T) is governed by the load, the spindle pitch and the efficiency of the screw drive and bearings. With short run up times and high speeds, the acceleration torque should be checked and additionally, in the case of leadscrew drives, the breakaway torque
The same calculation (page 33) as for ballscrew drives can be made to establish drive torque. In the case of leadscrew drives the efficiency (η) is much lower than for ballscrew drives.

Calculations:

$$T = \frac{F \cdot Pho}{2 \cdot 10^3 \cdot \pi \cdot \eta}$$

$$\eta = \frac{\tan \alpha}{\tan (\alpha + \beta)}$$

$$\eta^1 = \frac{\tan (\alpha - \beta)}{\tan \alpha}$$

where

η = the efficiency of conversion of rotary motion into linear motion.

η^1 = the efficiency of conversion of linear motion into rotary motion.

α = lead angle of the thread.

β = coefficient of friction

tan $\beta = \mu$ = coefficient of friction.

In general terms the efficiency of leadscrew (η) are based on a coefficient of friction of $\mu = 0.1$

	μ during start up		μ in motion	
	dry	lubricated	dry	lubricated
Metal nuts	~0.3	~0.1	~0.1	~0.04
Plastic nuts	~0.1	~0.04	~0.1	~0.03

Note: For efficiency values of Leadscrews please contact JENA-TEC Engineers.

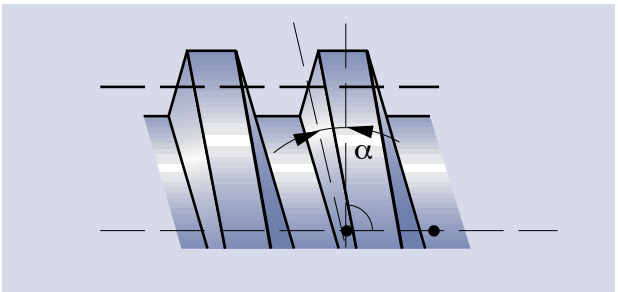

Fig 13

LEADSCREW INSTALLATION AND MAINTENANCE

INSTALLATION:
JENA-TEC leadscrew drives must be aligned carefully during installation. In the absence of suitable measuring equipment the drive should be turned through its entire length by hand before the drive unit is attached.
Variations in the force required and/or marks on the spindle indicate alignment errors between the spindle and guide.
In the case of mis-alignment the relevant mounting bolts should be loosened and the drive rotated through its entire length by hand. When a constant force is produced over the entire screwed length, alignment has been achieved.

PROTECTION:
Covers: by virtue of their design JENA-TEC leadscrew drives are less sensitive to dirt than ballscrew drives, particularly at low speeds (manual operation).
Leadscrew drives, especially with plastic nuts nonetheless, for long service life, require protection against dirt in the same way as ballscrew drives.

LUBRICATION:
Oil lubrication: this is used only in special cases for leadscrew drives.
Grease lubrication: This is the normal method of lubrication for leadscrew drives. Lubrication intervals are governed by operating condition; it is always advisable to thoroughly clean the spindle before greasing. The use of a high quality spindle spray, particularly before greasing, will increase service life.

OPERATING TEMPERATURES:
Depends primarily on the type of nut used, the condition of lubrication, and the environment. Please consult JENA-TEC Engineers in the case of temperatures above 100°C (70°C plastic nuts).

WEAR:
Can be checked manually; if the axial backlash with a single start leadscrew drive is more than $^1/_8$ of the pitch, the nut should be replaced.

FINISH

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