

### 8.4.2 High Load Ballscrew - Cool Type II



Germany Patent No. 20119457.0  
Taiwan Patent No. 193878

#### • Cool type II:

- New era for ballscrews applied in electric - driven injection machines, presses, power units, and other replaceable hydraulic drives.
- Electric-driven injection machines, presses, power units and other replaceable hydraulic drives.

#### • Design Principle:

The cool type series features forced cooling fluid passing through the nut, to minimize heat generation and thermal expansion during ballscrew operation.

- Cool type II as shown in the Figure 8.7:

Flowing fluids are circulated through a space, inside the nut, and exchanges heat with the cooler as shown in the Figure 8.8. It is most suitable for electric-driven injection machines, presses, and power units. The cool type II, compared with the standard specifications, will cause a minor external dimension change of the nut. Please contact HIWIN .

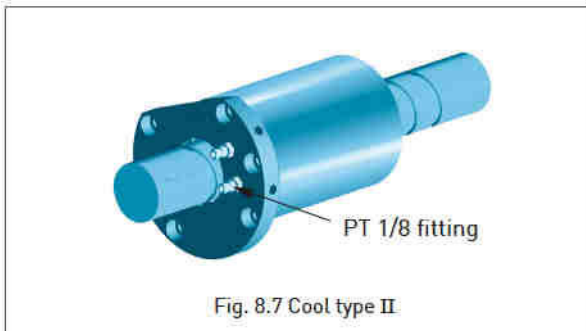


Fig. 8.7 Cool type II

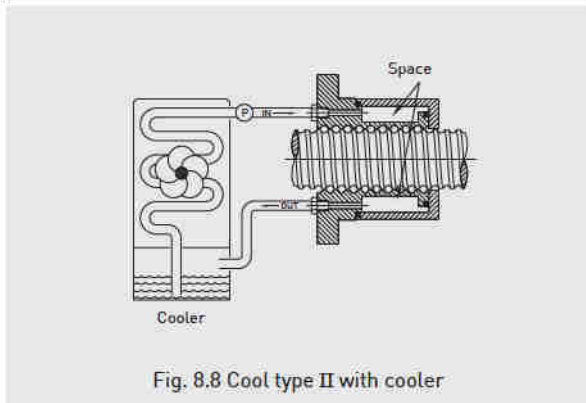


Fig. 8.8 Cool type II with cooler

#### • Specification:

1. We recommend a shaft diameter above  $\varnothing 32\text{mm}$  for cool type design.
2. Nut type: FSV, FSW, PFDW, OFSW, DFSV, FSH, FSI, etc.
3. Please contact HIWIN with other specifications you need.
4. The cool type II, compared with standard specifications, will cause a minor external dimension change of the nut, please contact HIWIN.

#### • Specification number:

Example: R63 - 16B3 - RSWC2 - 400 - 600- 0.05



C2 : HIWIN cool type ballscrew for type II

#### • Performance Comparison:

##### Test condition :

specification :  $\varnothing 50$ , lead 30 mm  
speed : 1500 rpm ( 45 m/min),  
back and forth feed continuously  
acceleration :  $4.9 \text{ m/sec}^2$   
stroke : 300 mm  
preload : 205 kgf  
moving weight : 300 kgf  
cooling rate : oil 2.5 liter/min  
inlet temperature :  $16^\circ\text{C}$   
room temperature :  $25^\circ\text{C}$

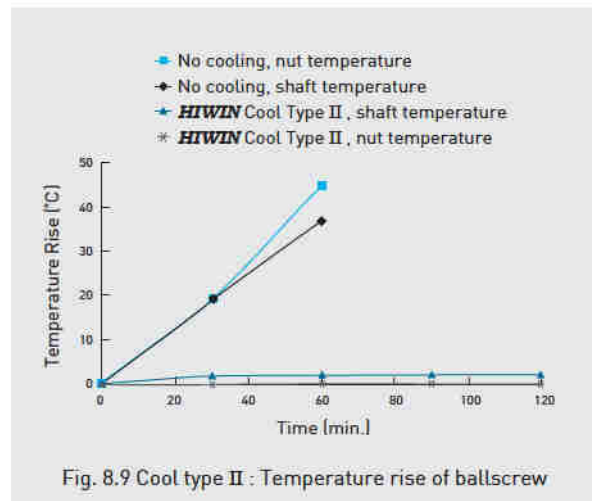


Fig. 8.9 Cool type II : Temperature rise of ballscrew

### • Features:

#### 1. Optimized design for high reliability:

Through use of computer simulation and FEM analysis, the cool type ballscrew features excellent thermal protection and high reliability.

#### 2. Promote higher speed rotation and extra high Dm-N value (up to 200,000):

Cool type ballscrews will eliminate high-speed rotation aftereffect, i. e., thermal problems, and promote higher speed rotation.

#### 3. Prevent thermal distortion:

Optimized heat transfer design minimizes heat generation and prevents thermal distortion.

#### 4. Strengthen durability:

When operating repeatedly, friction between balls causes heat generation, It may cause oxidization and decarburization of the rolling elements, which will affect service life of ballscrews. Cool type ballscrews will strengthen durability under a cooling environment.

#### 5. Extended lubricant life cycle:

When using lubrication, minimum heat generation further inhibits deterioration in the quality of lubrication and extends the lubricant life cycle.

#### 6. Higher feeding accuracy:

Cooling effect of cool type ballscrew will stabilize against thermal expansion and equalize feeding accuracy.

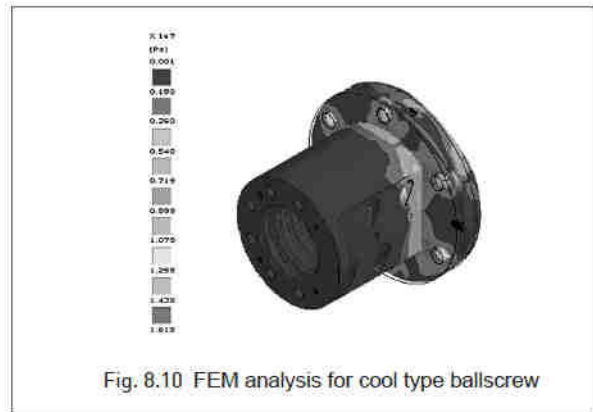


Fig. 8.10 FEM analysis for cool type ballscrew

## Average Life Cycle for Injection Machine Ballscrew

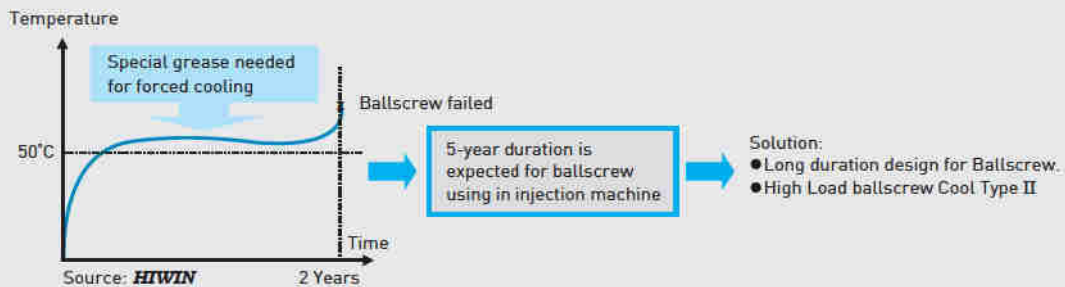


Fig 8.11 Life cycle for ballscrew using in general injection machine