N321. Getting Longer Life from Roller Nut Control Rod Drives

Roller nut systems are well established in the technology of control rod drive mechanisms (CRDM). With the advent of PWR technology during the 1950s and early 1960s, much engineering effort was expended on developing various designs of mechanical devices for positioning of control rods. Two basic designs of CRDM came out of these early years of PWR evolution: the roller nut type; and the magnetic jack type. Since 1961, Commercial Energy Products Corporation has been involved in the design of roller nut CRDMs for new reactor application. The company recognized that the future need in the evolution of CRDMs, particularly where load following is carried out, as at French PWRs, was life extension and lessening of the quantities of wear particles from materials containing cobalt. Current designs use cobalt alloys in the races and in the balls. The company has embarked on research and development effort to investigate new bearing material combinations for improved wear life and reduction in the use, if not elimination, of cobalt alloys.

A conceptual design for a long life roller nut CRDM has been developed and a bearing extended life wear test program is underway. The areas requiring further development in CRDM design are:

- Leadscrew
- Rotor assembly
- Pressure housing
- Stator and cooling jacket
- Position indication

For more, "Getting Longer Life From Roller Nut Control Rod Drives," by D. Bloom, Nuclear Engineering International, pp. 45-46, January 1992.