The following case summaries of actual applications will provide a better understanding of the capabilities of our Titespot® Coolant Driven Angle Heads. For more information, contact our Engineering Dept. toll free 1-877-435-8665 or visit us on the web at www.eltool.com.

Case Summary #1: Machining bleeder ports in overhead door closers

- **Piston bore dia:** 1.355”
- **Drill size:** .118
- **Drill depth:** .438
- **Drill speed:** 4000 rpm
- **Drill feed:** 5 ipm
- **Material:** Cast aluminum
- **Coolant pressure:** 300 psi
- **Coolant volume:** 8 gpm
- **Angle head:** Cat 40 shank, Size 1 head
- **Machining Center:** Mazak FH5800 HMC
- **Comment:** Eliminated secondary drilling operation, increased throughput, reduced scrap rate to zero.
Case Summary #2: Internal 3D contour milling of a forged aluminum aerospace component

End mill size: .375 roughing, .250 finishing
Depth of cut: .050
Stepover: .070
Cutter speed: 10000 rpm
Cutter feed: 20 ipm (finishing)
Coolant pressure: 1500 psi
Coolant volume: 13 gpm
Angle head: Cat 50 shank, Size 3 head (special 16” length)
Machining center: Hurco VMX 50 HMC
Comment: Indexable feature allowed contour grinding with one head and program

Case Summary #3: Drilling two rows of bleeder ports in the piston bore of a hydraulic motor housing

Drill dia: .196
Drill speed: 3-4000 rpm
Drill feed: 3-4 ipm
Coolant pressure: 1000 psi
Coolant volume: 8 gpm
Material: Ductile iron
Machining center: Mazak HMC Model 5800
Angle head: Cat 40 shank, Size 2 head
Comment: Eliminated secondary operation and parts indexer. Steps required to complete part reduced from 5 to 1.
Case Summary #5: Rough and finish machining of bearing seats on a large hydraulic pump housing

Cutter size: 3.5” flycutter with diamond insert for finish cut
Depth of cut: .040 per pass
Cutter speed: 4500 rpm
Cutter feed: 4 ipm
Coolant pressure: 1000 psi
Coolant volume: 5 gpm
Angle Head: Cat 50 shank, Size 3M (Milling style) head
Machining center: Mazak HMC Model 6800
Comment: Indexability feature of angle head eliminated need for multiple angle heads or part indexer

Case Summary #7: Drilling a cross hole in a chess piece (IMTS demonstration)

Drill size: .125
Feed rate: 10 ipm
Material: 6061-T6 aluminum
Coolant pressure: 145 psi
Coolant volume: 2 gpm
Machine: Daewoo Lynx 210A Lathe
Angle Head: Straight shank, Size 2 head
Comment: Light duty applications such as this one require relatively low coolant pressure.

Case Summary #8: Drilling in a transmission housing

Drill: \( \frac{1}{4} \) carbide
Feed rate: 25 ipm
Material: Cast aluminum
Coolant pressure: 1000 psi
Coolant volume: 8 gpm
Feed rate: 25 ipm
Machining center: Makino A88 HMC
Angle Head: Cat 50 shank, Size 2 head
Comment: At 300 psi coolant pressure, feed rate was 8 ipm
Case Summary #9: Drilling a boss on a helicopter drive shaft

Drill size: .500
Feed rate: 5 ipm
Material: 4140 Rc32
Coolant pressure: 1000 psi
Coolant volume: 8 gpm
Angle Head: Cat 50, Size 2M head with 5:1 gearbox.
Comment: Space limitations dictated use of compact Coolant Driven Angle Head vs. bulky mechanically driven head.

Case Summary #10: Milling targeting system housing in Titanium

Mill: 3/8 Ball nose carbide
Depth of cut: .050
Feed rate: 42 ipm
Coolant pressure: 1000 psi
Coolant volume: 8 gpm
Material: Titanium
Machining center Makino HMC Model A88
Angle Head: Cat 50 shank, 12” long Size 3M head ER-16 Collet
Comment: Ability of the Coolant Driven Head to provide sufficient rigidity over 12” “reach” was deciding factor vs. mechanically driven head.
Case Summary #11: Machining slots in a transmission housing

Feature: slot, .590 W X .300 D X 10” long (180 degrees apart 4 places, 2 each end of part)
Coolant pressure: 1000 psig
Coolant volume: 8 gpm
Angle Head: Size 3M (Milling Style), 10” length, ER-l6 Collet, Cat 50 Shank
Depth of cut/ feed rate: 1st pass: Down middle, .360 W X .300 D, 24 IPM
         2nd pass: .100 each wall, 28 IPM
         3rd pass: .015 each wall, 40 IPM
Material: Cast aluminum
Machine: Makino HMC Model A71
Total machining time: 8 minutes
Comment: Indexability, rigidity of 10” long Coolant Driven Angle Head as compared to bearing mounted mechanical head were deciding factors.

Case Summary #12: Milling “bayonet” slots in an aluminum and stainless steel aircraft locknut

Cutter diameter: .125” 2 flute (aluminum) and 4 flute (steel) carbide end mill
Depth of cut: .065” (2 places 180 degrees apart)
Speed: 5400 rpm
Feed:12 ipm (aluminum) and 6 ipm (steel)
Coolant pressure: 500 psi
Coolant volume: 9 gpm
Angle Head: Straight shank, Size 2M milling style
Machine: Mori Seiki Turning Center Model ZL 200 MC
Comment: Indexable feature of the angle head allowed milling at two radial positions with one angle head and one set-up.