



# Rotary Unions & Hydraulic Swivels

*& Electric Slip Ring Combinations*



**UEA**

# HYDRAULIC SWIVELS

## Responding to Customer Needs with Hydraulic Swivels

In response to many years of receiving requests to manufacture hydraulic swivels in combination with our slip rings, United Equipment Accessories (UEA) began engineering and manufacturing hydraulic swivels in 2012. As a solutions based company, we strive to offer customers a higher value through fewer suppliers, more compact designs and increased ability to respond to customer demands. We are excited to bring our over 60 years of manufacturing and engineering expertise to the hydraulic swivel and multi-media rotary union markets.

Hydraulic swivels, also known as hydraulic rotary swivels, rotary swivel joints and rotary unions, are precision components designed to transfer fluid from a stationary source to a rotating piece of machinery. UEA hydraulic swivel design concepts are refined utilizing SolidWorks solid modeling and Finite Element Analysis (FEA) to meet and exceed our customer specifications. We have state of the art, 5 axis CNC technology for manufacturing swivel components that allows us to machine from raw material to finished component in a single set-up. This technology makes us capable of manufacturing small, medium and large rotary solutions.



## Applications

- Grapples
- Scrap Processors
- Service & Utility Trucks
- Rough Terrain Cranes
- Deck Cranes
- Crawler Cranes
- Demolition Shears
- Manlifts
- Railroad Service & Maintenance Equipment
- Oil & Gas
- Off Shore Oil and Gas Platforms
- Maritime Cranes
- Shore Loading & Unloading Equipment
- Forestry Processor Heads
- Forestry Log Loaders
- Excavators
- Feller Bunchers
- Boom Trucks
- Military Applications

## Media (Fluid & Air)

Nearly any non-flammable media can be sent through a rotary swivel. **Examples include:**

- Hydraulic Oil
- Engine Coolant
- R134A Refrigerant
- Air
- Fuels

## Media (Electric)

Because our hydraulic swivels can be combined with electrical slip rings, our combination units can transfer a variety of electrical signals. **Examples include:**

- Electricity
- Ethernet
- CANopen
- J1939 CAN

# DESIGN CAPABILITIES

## Ports

- SAE ORB ports (-4 through -32)
- 4 bolt flange code 61 and 62 (all sizes)
- Working pressures usually limited by port size
  - » Larger ports have a lower pressure rating
  - » High pressures necessitate a more robust design; UEA utilizes a 4:1 safety factor in design
- If added flow characteristics are important, the flow passage area can be increased.

UEA uses hydraulic rotary seal technology that provides a lubricated polymer blend of material that is extremely extrusion resistant, non-aggressive to the mating dynamic metal surfaces, offers long term performance, lower cost and has a proven successful track record in demanding field applications for well over a decade.

## Energizer

- Square ring AN11 70A NBR
- Helps cap seal create a positive seal within its groove

## U-CUP

- One on each end of swivel prevents external oil leakage

## High Pressure Cap Seals

- Good extrusion resistance (without degradation)
- Non-aggressive to mating surfaces (won't create wear path damage)
- Side wall notches for increased shifting speed within seal groove
- Wide temperature range
- High precision lathe cut seals of a lubricated polymer blend
- OD and ID dynamic styles

## Wear Ring

- Acts as a bearing surface to prevent spool and housing from metal to metal contact

## Excluder Seal

- Acts as a dust and debris seal to shield ingress of outside contaminants

## Thrust Washer

- Acts as a bearing surface for thrust loads

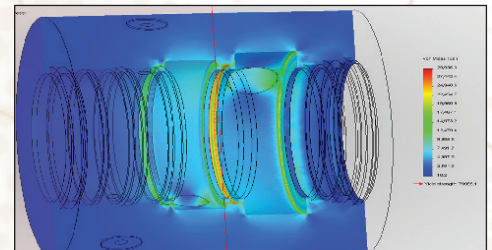
# DESIGN TECHNOLOGY

## SolidWorks

- Solid models
- FEA analysis
- 2D drawing creation

## Esprit

- CAM software
- Creates programs for CNC machines
- Simulates machining of parts

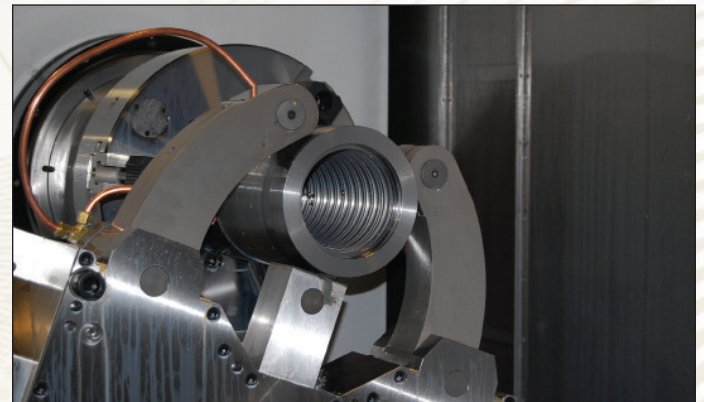
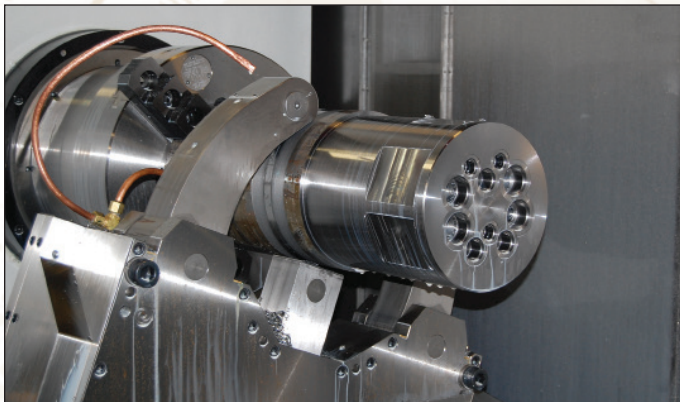
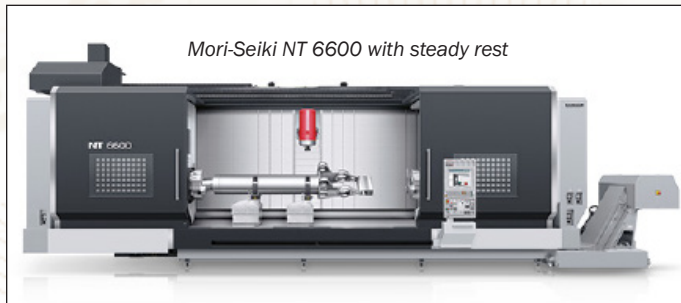


# MACHINING CAPABILITY

Hydraulic swivel manufacturing begins with CAM (Computer-Aided Manufacturing). Our swivels are then fabricated by state-of-the-art 5 axis, precision CNC multi-tasking machines, capable of completing every machining operation required from raw material to finished component all in one initial set up.

The utilization of smarter CNC machining centers combined with smarter engineered designs are a recipe that adds up to lower overall costs. The benefits include:

- Our multi-functional manufacturing capabilities allow us to load one bar or tube into a machine and it comes off complete, there is no cost involved with multiple set-ups.
- Each Esprit program is optimized with the manufacturing work center to control process costs.
- With complete automation features intact throughout the entire manufacturing process from start to finish, the human interaction and error factor is near nil which also relates to ongoing repeatability and near nil scrap factor.
- Costly lead time effects are greatly reduced by having the flexibility to bring a finished part into existence at a rapid pace.



# CLEAN ROOM ASSEMBLY

## Parts Washing

- Prior to entering the clean room, all components are washed in a high pressure parts washing system. The washing process ensures only clean parts are entering the clean room.

## Swivel Assembly and Automated Testing in Clean Room Environment

- 2,000 square foot Pharmaceutical Grade Assembly and Testing clean room
- Class L 100,000 FS 209E
  - » 8 ISO 14-644
  - » HEPA 99.9% efficient at .43 microns
- Before leaving the clean room, a production test is performed on all swivel ports prior to being completely sealed. After sealing, they are ready to be shipped to our customers.
  - » All ports 100% leak tested at 1.5x max operating pressure
  - » Test oil cleanliness set to 17/15/12 or better
  - » Pressure leak test up to 6 ports simultaneously in one test cycle
  - » Test pressure up to 7,500 psi
  - » Real time monitoring and recording of pressure, rotating torque and oil cleanliness levels
  - » All test data is documented and saved for each serialized swivel



*Production Test Stand*



## Factors That Dictate Swivel Size

- Center through-hole size
- A liquid tight cord grip
- The number, pressure rating and size of ports
- 4-Bolt flange ports vs. SAE ORB ports

## Small Swivels

Internal bore diameter: 3" to 5"  
 Overall length: 6" to 14"  
 Number of passages: 2 to 6

2 Port Hydraulic Swivel



2 Port Hydraulic Swivel



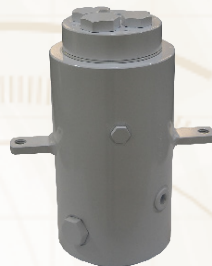
3 Port Hydraulic Swivel with Integrated 4 Conductor Slip Ring



## Medium Swivels

Internal bore diameter: 5" to 7"  
 Overall length: 14" to 30"  
 Number of passages: 6 to 12

6 Port Hydraulic Swivel



12 Port Hydraulic Swivel



6 Port Hydraulic Swivel



## Large Swivels

Internal bore diameter: 7" and up  
 Overall length: 30" and up  
 Number of passages: 12 and up

13 Port Hydraulic Swivel



14 Port Hydraulic Swivel with 12 Conductor Slip Ring



15 Port Hydraulic Swivel



# HYDRAULIC SWIVELS WITH SLIP RINGS

Depending on customer and application requirements, UEA can provide slip rings and hydraulic swivels as an integrated unit, semi-integrated or as two separate units designed to perform together in synchronization.

## Integrated

The slip ring sits within the steel housing and is sealed with a steel top plate.

- Compact
- Fewer parts
- Very rugged enclosure

3 Port Hydraulic Swivel  
with 8 Conductor Slip Ring



12 Port Hydraulic Swivel  
with 6 Conductor Slip Ring

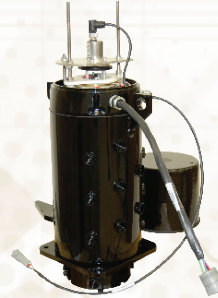


## Semi-Integrated

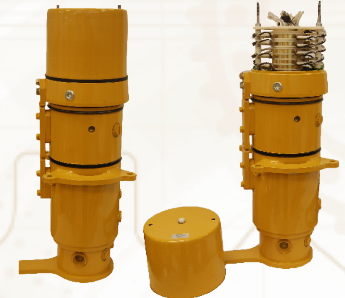
The base casting of the slip ring sits directly on top or bottom of the hydraulic swivel.

- Reduced height
- Maintenance accessibility
- No mounting tube

11 Port Hydraulic Swivel  
with 6 Conductor Slip Ring & Encoder



Hydraulic Swivel, Engine Coolant Swivel,  
Slip Ring Combination Assembly Unit



## Separate

Two completely separate, individual units.

- Easily separated
- Mounting tube can be lengthened to preference
- Reduced heat transfer between units

4 Port Hydraulic Swivel  
with 9 Conductor Slip Ring



6 Port Hydraulic Swivel  
with 9 Conductor Slip Ring



4 Port Hydraulic Swivel  
with 23 Conductor Slip Ring





## General Features

- Patented double pivot brush design
- Superior cleaning action
- High contact pressure
- Two copper graphite brushes/circuit minimum
- Copper alloy rings
- Temperature extremes, -40° F to 200° F (-40° C to 93.3° C)
- Corrosion inhibiting parts used throughout
- Brass set screw connectors for easy center harness attachment
- 150 R.P.M. maximum rotation speed
- 1" bore fits inside housing diameter 4.500" (114.3 mm)
- Built to UL and CSA standards
- Brushes designed for installation on two 5/16-18 stainless steel studs

## Optional Features

- Pre-wired harness(es)
- 1 to 20+ (dependent upon conductor rating) circuits
- Many combinations of amperage and voltage
- PVC or aluminum enclosure materials
- Solid coin silver ring or silver plated ring with silver graphite brush for low-level signal applications
- Mounting tubes
- Treated aluminum with stainless steel hardware for corrosive atmospheres
- Oil impregnated bronze bearing for high ambient temperature accepts 1.50" (38.1 mm) O.D. tube
- Ball bearings

## CONDUCTOR HEIGHT CHART

AMPERAGE	VOLTAGE*	CONDUCTOR HEIGHT / CKT** (inches/mm)
6.0	28	0.090 (2.29)
7.5 Silver	28	0.134 (3.40)
7.5	28	0.134 (3.40)
7.5	120	0.249 (6.32)
7.5	220 - 600	0.353 (8.96)
10 - 20	28, 120	0.281 (7.15)
10 - 20 Compact	220 - 600	0.396 (10.07)
10 - 20	220 - 600	0.500 (12.70)
30 - 45	28, 120	0.469 (11.91)
30 - 45 Compact	220 - 600	0.584 (14.83)
45	220 - 600	0.688 (17.46)
75	28 - 600	0.688 (17.46)
120	28 - 600	1.458 (37.03)

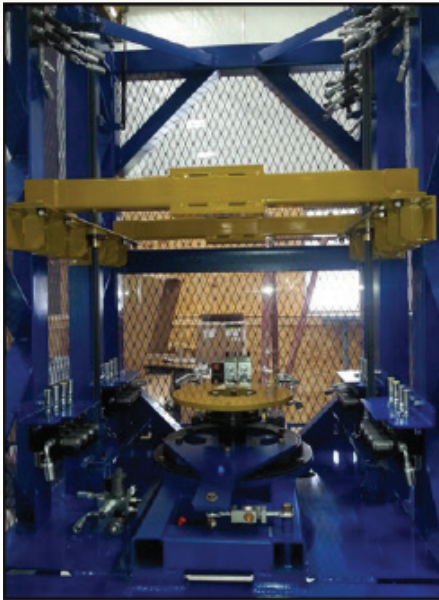
\*28V-DC, 120V-AC, 220-600V-AC or V-DC, 120A, 600V  
 \*\*Tolerance 3%. Heights are approximate.



# ENDURANCE TEST STAND

United Equipment Accessories' Endurance Test Stand was built entirely in-house for the purpose of conducting accelerated life testing of hydraulic swivels. The stand's control program uses a test procedure that strictly follows a specified set of testing parameters. A myriad of sensors measure the response of the tested elements under simulated conditions for a specific period and for a certain threshold.

The Endurance Test Stand sits in a specially designed room that has its own ventilation system, automatic fire suppression, and a two hour fire rating. Two webcams connected to the network provide 24 hour video access to the Endurance Test Stand.



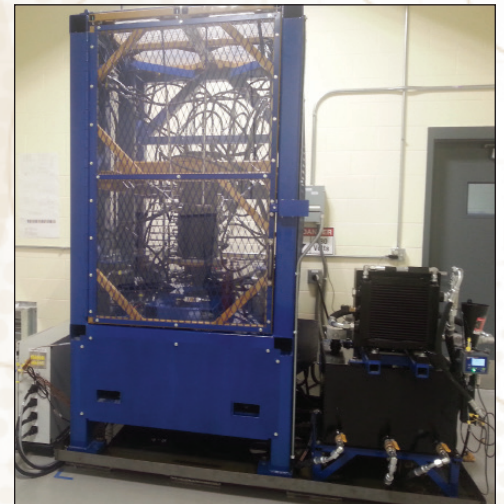
## Real Time Monitoring

Using sensors and control software, the following data is monitored and recorded during endurance tests:

- Rotation speed and torque capability
- Hydraulic pressure
- Temperature
- Fluid cleanliness
- Door open/close position

## Test Stand Specifications

- 16 test channels for low, medium or high pressure
- Low, medium, high pressure pumps and transducers
- Automatic safety shut off



# HOW TO ORDER UEA HYDRAULIC SWIVELS

# 1

## Contact UEA:

PH: 800.394.9986 or 319.352.3946

FAX: 319.352.2175

[www.uea-inc.com](http://www.uea-inc.com)

# 2

## Provide us with the following information:

*Please be as complete as possible. Visit [www.uea-inc.com/request-a-quote](http://www.uea-inc.com/request-a-quote) to fill in all the required information.*

### Rotary Union Type

- Check All That Apply:
  - Hydraulic Swivel  Electrical Slip Ring
  - Water  Engine Coolant  Pneumatic
  - Other
- Design Type:
  - New Design  Replacement Design
- Drawings Available:  Yes  No
- Will Prototypes Be Required:  Yes  No
- Estimated Annual Usage
- Industry Identification

### Application and Working Conditions

- Description of Application
- Duty Cycle in Revolutions:
  - \_\_\_\_\_ Per Hour  \_\_\_\_\_ Per Day
- Rotations Per Minute
- Continuous or Intermittent
- Any Drawings or Photos

### Environmental Conditions

- Check All That Apply:
  - Abrasive  Corrosive  Rain
  - Outside of Normal Operating Temperatures  
(-40° F to 200° F)
  - Outdoor  Explosive  Dust
  - Salt Air  Other

### Total Number of Passages \_\_\_\_\_

- Port Size
- Port Type
- Max Operating Pressure
- Fluid/Media
- Flow (GPM) Per Passage
- Function

### Max Envelope

- Diameter: \_\_\_\_\_ cm
- Length: \_\_\_\_\_ cm

### Other Notes



**For helpful tips and updates for engineers, visit:  
[uea-inc.com/resources/blog](http://uea-inc.com/resources/blog)**

P.O. Box 817 • Waverly, IA 50677-0817  
PH: 319.352.3946 • FAX: 319.352.2175  
USA 1.800.394.9986 • [www.uea-inc.com](http://www.uea-inc.com)