

Wichita Clutch AquaMakks Brakes Helps Slow Spiraling Equipment Costs

In spite of its demand as a global commodity, the price of oil can be wildly unpredictable. A jumble of geopolitical forces, environmental factors and seasonally fluctuating demand combine to make oil futures prices anything but certain. But the cost of drilling for that oil – that’s a different story.

Whether oil prices are up or down, the costs of getting to that oil can be reliably predicted to become ever more expensive. And a significant component cost of oilfield exploration is the specialized equipment that’s required. But sometimes, a stroke of engineering innovation results in a leap in technology that actually helps to contain costs rather than contributing to the incessant upward spiral.

That’s the case with the new dual actuator AquaMakks drawworks brake developed by Wichita Clutch. The dual actuator option adds another layer of versatility and cost-effectiveness to Wichita’s popular line of AquaMakks brakes.

Looking For a Better Solution

Tri-Service Oilfield Manufacturing (TSM) manufactures drawworks for the drilling and service rig industry. TSM engineer Andy Leibel explains that drawworks “provide a means of raising and lowering the drill string for vertical and horizontal drilling applications.” The braking system of a drawworks assembly is obviously a critical component.

Searching for a way to control equipment costs, TSM contacted Wichita Clutch and inquired about the possibility of a single brake solution to be used on their drawworks. They wanted a single unit assembly that would provide both tension braking and spring-set failsafe parking.

TCM engineers collaborated with Wichita Clutch in the design of the new product. “We gave Wichita our drawworks parameters such as static and dynamic stopping and retarding conditions,” said Leibel. “Wichita then sized the brake as required to meet our desired service factor. The physical size was also reviewed to ensure that our drawworks and brake were a good match together.”

Two Brakes in One – But the Innovation Doesn’t Stop There

The resulting product was Wichita Clutch’s dual actuator AquaMakks brake. According to Richard Mayberry, Engineering Manager at Wichita Clutch, “TSM wanted to be able to use the brake as the primary static holding or parking brake, along with being used as a dynamic brake.” The goal was achieved. In dynamic tensioning mode, the AquaMakks dual actuator brake can absorb up to 3,400 HP – 35% more than the closest competitor.

And for static parking, the unit provides a torque rating sufficient to hold 750,000 lbs. on 12 lines.

But the AquaMakks incorporates a number of innovative features; perhaps the most pioneering is the composite water jacket.

Use of High-Tech Composites at an All-Time High

The use of metal is losing its iron grip on the world of manufacturing. Advanced composite materials offering dramatic improvements in strength-to-weight ratios and superior corrosion resistance are replacing metal in many applications. Consider Boeing's new 787 Dreamliner - half of its primary structure is built of composite materials. And yet the Dreamliner is setting new performance standards unmatched by aircraft of traditional all-metal construction.

But the benefits of modern composites are applicable to many industries outside the field of aerospace. So Wichita Clutch took a cue from the aerospace industry in solving a problem that's plagued the operators of heavy-duty industrial brakes for decades.

"In the oilfield sometimes the quality of water used in brake cooling systems is not of a high quality," Richard Mayberry explained, "and over a short period of time can severely corrode the working internals of a water jacket. But the composite material water jacket of the AquaMakks is impervious to widely ranging quality issues."

The superior corrosion resistance of the AquaMakks will be a boon to offshore operators using saltwater as a coolant. But water quality is an issue in many locales. Some Texas oilfields, for instance, must deal with highly acidic water with a very low pH value – very corrosive to water jackets of traditional iron construction.

A side benefit of the AquaMakks composite water jacket is significant weight savings, with a weight reduction of 50% or more compared to brakes utilizing iron water jackets. This can result in weight savings of thousands of pounds in the largest units – a great benefit for mobile applications such as truck-mounted units. And the advantages of composite construction come without any sacrifice in strength. In stress testing, engineers were unable to induce a structural failure even when stressing the unit to more than four times its maximum design load.

Easy Maintenance, Easy Retrofit

The dual actuator AquaMakks also helps operators hold down costs by making maintenance a faster, less labor-intensive task. When the copper alloy wear plates need to be adjusted for wear, the process is as simple as removing some shims; disassembly of the unit is not required. Inspection and maintenance is also simplified with the open case design, providing easy access to key components. To help speed the process of repair and replacement, the AquaMakks design uses fewer mounting bolts than competing units.

And the design of the AquaMakks provides for quick and easy replacement of older single actuator brakes. Richard Mayberry of Wichita Clutch said that the main design challenge “was to make the dual actuator head assembly such that it can be retro-fitted onto existing brakes without impact to the rest of the brake unit. Simply remove the normal air tube holding plate, install the dual actuator head assembly and go back to work.”

There’s even an option that allows for easy interchangeability with competing models by matching the mounting bolt pattern and tooth profile. In fact, making the unit interchangeable with other models was a unique requirement of the TCM team. According to Andy Leibel of TSM, “no significant changes need to be made to the drawworks to drop in this unit in place of the competitor’s.”

Sometimes the ‘Cutting-Edge’ Cuts Costs

In the world of technology, keeping up with the latest and greatest of cutting-edge advancements can be costly. But sometimes, investing in the best and most technologically advanced equipment can really pay off in reduced operating costs. And the new dual actuator AquaMakks is a perfect example.