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Boston Gear

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Marland Clutch

Industrial Clutch

Bauer Gear Motor

Svendborg Brakes

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Warner Linear

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# Keeping Their Cool

## Marine Clutches and Brakes



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An Altra Industrial Motion Company

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## Marine Clutches and Brakes

*The marine environment is extremely harsh and delivering equipment capable of performing reliably and efficiently requires expert design engineers combined with advanced materials technology. Neil Wright, Managing Director of Wichita Clutch, assesses the requirements of modern marine clutches and brakes, which play such a crucial role in a variety of applications.*

As marine exploration for oil and gas continues to greater depths, the equipment used to exploit the new reserves needs to perform on a whole new level. However, it is not sufficient to just increase the size of new products, as space on vessels remains limited. This requires designers to be innovative and develop new materials, especially when heat dissipation forms such a crucial performance aspect.

### Drilling Platforms

There are a wide range of marine applications that employ clutches and brakes for the safe control of various processes. One of the more arduous examples is the control of mooring cables on semi-submersible drilling platforms. When these vessels are to remain on station for an extended period, a mooring pattern - often over an area of 6 km - is spread using a series of winches and brakes to control the cable pay-out.

Anchor handling vessels are used to transport and lay up to 16 anchors. This requires the pay-out tension to be controlled as the vessels move further away from the platform and the cable weight increases. Typically each corner of the platform is equipped with two mooring winches. These traditionally required two secondary brakes; one for static holding once the anchors are laid and a second slipping brake to control cable pay-out. By using the latest design techniques Wichita Clutch has developed a dual-acting, water cooled dynamic braking system, capable of doing both jobs. The brake controls the pay-out of the cable at typical speeds of 40m/minute, generating around 250 tonnes of tension on the cable. Once the anchors have been laid, the spring-applied actuator provides the static holding force.

In any braking application it is important to consider the brake's heat dissipation capability. If the heat generated by the friction of the cable tensioning duty exceeds the convection capacity of the unit to dissipate it, the brake's operation may become compromised. During the pay-out of the mooring cables typical power levels of 1,600 kW of continuous heat energy can be produced due to the high torque slipping of the brake.



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Providing a brake which is capable of high heat dissipation not only maintains reliability and extends operating life, it also allows the use of a smaller brake which provides cost savings. Copper discs are used for high heat transfer from friction surface to the continuous flow of cooling water. The use of an advanced water jacket design, coupled with the copper wear plates, provides precise stopping/tensioning capabilities with very high heat dissipation characteristics.

### **Water Cooled Clutches & Brakes**

The industry standard has been to use cast iron water jackets, alternating with copper wear plates, to dissipate the high heat generated in heavy-duty tensioning applications. In marine environments however, salt corrosion creates maintenance issues that necessitate frequent repair or replacement of the cast iron water jackets.

To address this issue, Wichita engineers have developed a composite material for use in the new water jackets which has undergone extensive stress testing and extended durability testing to assess the corrosion resistance for offshore applications. However, new materials only form part of the final solution, as designers also modified the water flow configuration to provide a more efficient heat transfer.

The new composite material provides greatly improved corrosion resistance but also reduces the overall weight of the water jacket, in some units by more than 50%. The overall results of these design changes have delivered a 35% increase in heat absorption compared to previous heavy-duty designs.

### **Custom Designs**

Many marine applications, especially the larger installations, require a custom-made solution, capable of performing to exacting requirements that may not be fully met by an off-the-shelf product. The starting point is the gearbox manufacturer which, coupled with the wider view of the complete application, allows the most suitable arrangement to be developed.

Whether a project is large or small, most products with this type of large power transmission system are custom manufactured to a greater or lesser degree; though often based on an existing design. Proper consultation is absolutely essential and, if the engineers are designing to a specification, then it is always best if they can be involved in forming that specification.



The AquaMaKKs series of brakes from Wichita are well known for offering a simple design which performs reliably in high torque applications in harsh environments.



Wichita provides expertise in marine applications, allowing it to add value to the design process as well as providing innovative materials and solutions for a wide range of marine applications.



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### **Extended Customer Support**

There are several criteria which come into play when supplying large items of power transmission equipment on a global basis. The ability to both deliver and provide effective technical support for a large item of plant equipment anywhere in the world is critical to success in today's global business climate.

When you manufacture a niche product the knowledge and machines required to design and manufacture each item - often to a custom specification - have to be concentrated in a limited number of locations. This means that the distribution, delivery and support network must be highly efficient to ensure that customers not only receive their products according to the schedule, but also provide the on-site expertise for installation and commissioning.

Large power transmission projects tend to be, by their very nature, unsuitable for 'catalogue solutions'. Wichita provides expertise in such applications allowing it to add value to the design process as well as providing innovative materials and solutions for a wide range of marine applications. Wichita Clutch is part of the Altra Industrial Motion group, which manufactures and supplies the world's largest range of industrial clutches, brakes, couplings and geared motors.



*An Altra Industrial Motion Company*

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