



Marine Renewable Systems

Marine Swivels, Communication Equipment,
and Sensors

FOCALTM

Moog Focal has had one focus over the years - responding to the global demands for power and data transmission solutions.

For over 30 years, Focal Technologies, a Moog Inc. company, has been providing marine swivels, marine electronics, condition monitoring and ancillary equipment specifically **designed, built, tested and certified for long term deployment in harsh marine environments.**

Moog Focal provides a complete rotary solution for power, data signal, fiber optic communication, and fluid / gas into a single integrated assembly, **simplifying your design and installation.** A broad range of marine electronics to interface with control systems can be supplied. A unique condition monitoring product line helps **reduce down time and save operating costs.**



Our knowledgeable engineering staff can help at the beginning of a project with selecting standard solutions and products, or work closely with you to design custom solutions that meet your unique needs. Project management services are available to help get your system to market **on time and on budget.**

Moog Focal has been ISO 9001 certified since 1993, and therefore you can have confidence that all of our products are designed and built under the close scrutiny of a continuously improving quality system. As a part of Moog, Focal has access to a large global support network and decades of experience delivering custom integrated and **proven products for the harshest marine environments in the world.**

Marine Renewable Applications

Moog Focal swivels are used for surface or subsea applications to enable the transfer of power, signals and fluid across a rotary interface.

Mooring System

Many tidal generation devices are designed to weathervane about the mooring point to maintain a heading into the tidal stream. Moog Focal swivels enable the transfer of power and signals from the tidal energy device, across the mooring system rotational interface to the export cable on the seabed.

Mooring Slip Ring Advantages

- Prevent cable twist up
- Passively orientates into the tidal stream



Courtesy of Scotrenewables Tidal Power Ltd.

Pitch Control

Wind energy and tidal turbines utilizing active blade pitch control benefit from Moog Focal rotary joints to transfer power and signals between the pitch control systems located in the rotating blades to the nacelle.

Pitch Control Slip Ring Advantages

- Transfer of electric, hydraulic, fiber optic or hybrid pitch control signals
- Long-life rotary solutions



Key Capabilities

- Front end engineering design support
- Designs to meet application and classification requirements, including marine certifications
- Medium to high voltage slip rings operating between 3.6 kV - 145 kV
- Up to 52 singlemode or multimode optical channels
- Transfer of high pressure fluids with leakage collection option
- Ingress protected for surface or subsea applications
- Long-life, low maintenance
- Supplier of swivels for harsh environment applications for over 30 years
- Condition monitoring systems available
- Multiplexing and media conversion available

Marine Renewable Product Offerings

Swivels

In Marine Renewable energy applications, swivels are typically provided for the yaw axis allowing alignment with the flow of water or air, and on the main rotor axis to provide power and signals for pitch control of the blades. Moog Focal can address all of these requirements providing a wide range of standard and custom marine swivels supporting: electrical signals and power (3.6 kV - 145 kV); fiber optic communications up to 52 channels of single mode or multimode fiber; fluid / gas up to 35,000 psi. These can be combined as required into an all-in-one hybrid solution. Subsea moorings which connect a rotating tidal or wind turbine to the seafloor can include an IP68 rated subsea swivel for permanent immersion, providing greater flexibility on the mooring and structure design.

ROTARY SOLUTIONS

1



SUBSEA SWIVEL

2



Marine Electronics

Robust fiber optic media converter and multiplexer communication products designed to work and operate in harsh marine environments with support for real-time Ethernet control systems (EtherCAT, Ethernet/IP), standard serial connections, as well as video and sonar. Using marine electronics designed for long term deployment reduces down time and field support. Onboard diagnostics are an integral part of our comprehensive condition monitoring system.

MARINE ELECTRONICS

3



5





CONDITION AND OPTICAL MONITORING SYSTEM 4

The image shows a computer monitor displaying a software interface for condition and optical monitoring. The interface includes various data points, graphs, and a circular inset showing a close-up of a circuit board. In front of the monitor is a server rack with several drive bays. The entire scene is set against a dark background.

Condition Monitoring

Down time for marine installations can be costly. Focal products support a unified condition monitoring system which provides preventative maintenance scheduling, continuous performance monitoring and rapid troubleshooting. This is accomplished with sensors and data logging in the swivel that monitors optical losses in the fiber, performance characteristics of the slip ring, and the health of the marine electronics.

MEDIUM VOLTAGE JUNCTION BOX 5

Ancillary Equipment

Supporting equipment is also available, including junction boxes, subsea pressure bottles, and Pressure Balanced Oil Filled (PBOF) enclosures.



GEMINI SONAR 6

The image shows the Gemini sonar device, a blue and black cylindrical sensor, next to its graphical output on a screen. The screen displays a 3D sonar scan of a marine environment with various targets highlighted in purple and red. The device is labeled 'Gemini' and 'Tritech'. The screen also shows 'Tritech' and 'Gemini sonar' logos.

Mammal Detection

The combination of the Trittech Gemini sonar and SeaTec software provides real-time target tracking (e.g. mammal, shark, debris, etc.), early warning and data logging around subsea turbine sites.

Service and Installation

Installation

- Mechanical: installation and verification
- Electrical: terminations, connections and testing
- Fiber Optic: terminations, connections, fusion splicing and testing
- Fluids: connections and testing
- Pressurization Systems: piping/fitting, configuration and testing

Commissioning

- Onshore and offshore
- Systems verification
- Troubleshooting
- Calibration / adjustments
- Mechanical, electrical, fiber optic and fluid completions

Service

- Onshore and offshore
- Scheduled / planned maintenance
- Inspection / survey
- Spares
- Upgrades
- Requalification / recertification
- Life extension

Our offshore-certified field team will ensure successful installation, commissioning and planned maintenance. Should the need for unplanned service arise, we provide a quick response to all inquiries and rapid mobilization worldwide at competitive rates.

Focal Technologies is a proud member of the Moog Inc. family. Moog designs and manufactures high performance motion control solutions for a variety of applications including aircraft, power generation, test and simulation, wind energy, marine, motorsport and others.

With operations in more than 26 countries, Moog delivers a high level of service, support and collaborative expertise tailored to the requirements of machine builders and design engineers worldwide. Moog Focal works closely with Moog divisions worldwide, increasing our ability to offer a large portfolio of leading-edge custom solutions and services that set the pace in today's rapidly changing global markets. Moog Focal marine solutions can also be made compatible with Moog's pitch control systems.

Contact Us

Contact Moog Focal for any assistance in selecting the best solution for your requirements.

For more information, please contact:

- Web: www.moog.com/focal
- Email: focal@moog.com
- Tel: +1-902-468-2263



FOCAL™

Focal Technologies Corporation | A Moog Inc. Company

77 Frazee Avenue, Dartmouth, Nova Scotia, Canada B3B 1Z4, Tel: +1-902-468-2263 | www.moog.com/focal

© 2017 Moog Inc. BRMRE-V1.1