



“Quality by Design, Satisfaction by Performance”



Background

Ballast control and monitoring systems on offshore drilling vessels are one of the most critical systems on these vessels. The lives of your crew and safety of the vessel depend upon the ballast system operating reliably and properly, particularly under adverse or emergency conditions.

Whether the drilling rig is a new build or part of an aging fleet undergoing refurbishment, careful consideration must be paid to the ballast system and to those you select to supply and install these systems.

Innovative Electronics is an experienced and technically competent, systems solutions provider, which has delivered safe, reliable, agency certified, ballast systems for numerous floating drilling vessels throughout the world.

Ballast control and monitoring systems for offshore drilling vessels have changed dramatically over the past few years, mainly due to more stringent regulatory, operational, and safety requirements. Recent rule changes by ABS, DNV, SOLAS guidelines and others have made the requirements for the design and operation of ballast control systems more critical than ever. Even as

the sophistication of these systems has increased dramatically, the limited availability of qualified personnel worldwide has created the need for ballast systems which are easy to understand and operator friendly. Innovative Electronics is experienced in filling this need reliably, safely, and to customer specifications while meeting specified regulatory requirements.

Design Philosophy

The days of proprietary, one-manufacturer system components are over. Innovative Electronics design philosophy is based on the concept of “**Open System Architecture**.” This means that the hardware and software components used are selected as standard off-the-shelf products from such major manufacturers as Allen-Bradley®, Modicon®, Siemens®, GE Fanuc®, Moore Process Automation Solutions, WonderWare®, Citec®, Microsoft®, and others. In addition, all components are selected for compatibility with each other, as well as other systems currently installed on the rig.

By using nonproprietary, open architecture components, Innovative Electronics can offer simple, reliable systems that compete favorably on initial and life-cycle costs, operational maintainability, and worldwide spares availability. The major systems of today's modern drilling vessels use a combination of components from various vendors. These components must be available from numerous sources worldwide.

Innovative Electronics' “**Open System Architecture**” design philosophy ensures that our clients can easily interface with other rig systems and obtain replacement parts worldwide.

Safety Through Redundancy

Safe, reliable ballasting operations are the ultimate goal of any ballast control system. Innovative Electronics

engineers take care to design and implement your system so that no single point of failure will result in the inability of the system to effect ballasting operations.

Redundant systems are implemented through numerous means including, but not limited to redundancy of the PLC CPUs, PLC I/O, tested and monitored PLC I/O, PC controls, software sub-systems, communications systems, and conveniently located manual backup systems.

Innovative Electronics relies on the extensive use of Failure Mode Effects Analysis (FMEA) to ensure that the ballast system will operate safely and reliably even under adverse or emergency conditions. As regulatory and insurance requirements become more stringent, the reliability and availability of a ballast system to perform its designed functions is critical to maintaining rig safety, uptime, and profitability.

Meeting Regulatory Requirements

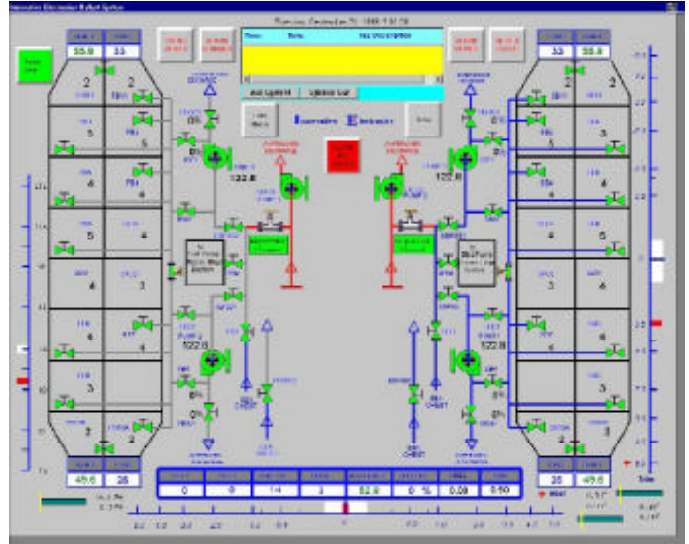
At Innovative Electronics meeting regulatory requirements begins in the project proposal phase, not as an afterthought at systems test. Innovative Electronics has implemented many offshore systems which have successfully met regulatory requirements and regulatory agency inspections. We have experience in working with all major offshore regulatory authorities, including, but not limited to ABS, DNV, USCG, Lloyd's, and others.

Human Machine Interfaces (HMIS)

The Human-Machine-Interfaces (HMI) are the most visible part of any Ballast Control System. The HMIs can take many forms, from sophisticated touch screen display terminals to electro-mechanical mimic boards. Today's modern technology also allows HMI terminals to be located at strategic remote points outside of the ballast control room.

All ballast tank levels, valve positions, and pump operations are controlled and monitored from the HMIs. Proper design of the HMIs is one of the most crucial items when it comes to safe and effective control of ballast operations.

Innovative Electronics is fully experienced in designing and implementing HMIs to meet our clients needs. Our designs have included the design of electronic, electro-pneumatic, touch-screen, and remote HMI interfaces. We have configured various HMI styles to meet the varying requirements of rig design, regulatory requirements, safety, and operator convenience. HMIs operating on computer platforms can be implemented with any number of commonly available HMI packages such as WonderWare®, CIMPLICITY HMI® Citec®, VXL® and others. PC operating systems can be designed to run under Windows 95/98®, Windows NT®, Unix®, Linux, and others. Our unique ability to implement widely varying technologies allow us to provide a clear, easily understood display, of all ballast system parameters is of major importance to ballast operators and rig owners alike.



Interface With Other Systems

Modern drilling equipment requires all systems on the rig to communicate with one another. Innovative Electronics ballast control systems are a module of our unique **FIRMS® Fully Integrated Rig Management System**. Our modular open systems design protocols let the ballast system interface with numerous other systems on the rig, including but not limited to, engine monitoring, environmental, stability, windlass tensioning, fire & gas, communications, GPS and others.

Interface with other system is accomplished by using non-proprietary industry standard communications protocols, such as TCP/IP, ModBus RTU, Allen Bradley Data Highway, Genius Bus, Microsoft DDE server, and others. Inter-system communications can be implemented by a variety of means, including but not limited to, shielded twisted copper wire, coaxial cable, and fiber optic networks. As with the main ballast system, redundancy and single point failure problems are eliminated at the design stage.

FIRMS® - Modular Components

Fully Integrated Rig Management System

Innovative Electronics has designed our ballast control systems to be part of our Fully Integrated Rig Management System (FIRMS®). Like our other FIRMS® components, our ballast control systems can be implemented as a stand alone system, or as part of a total rig management system.

Innovative Electronics has the unique capability to design and implement these systems across multiple hardware and software platforms. This allows components

of the FIRMS® systems to be implemented over a period of time, saving capital costs, downtime, and eliminating project scheduling conflicts. Key components of the FIRMS® system include:

- Floor and Crown Protection Systems
- Rig Power Monitoring Systems
- Driller's Cabins and Consoles
- Emergency Shutdown (ESD)
- Engine Monitoring Systems
- Mud Monitoring Systems
- Ballast Control Systems
- Drawworks Control Systems
- Windlass Tensioning Systems
- Environmental Monitoring Systems
- Fire & Gas Detection and Suppression Systems

For additional information see our **FIRMS®** brochure.

Your Rig Systems Partner

Innovative Electronics' business philosophy is to work as a partner with our clients, not just a vendor. When you chose Innovative Electronics to supply your rig systems needs, you will be working with a partner who will design systems to your specifications and to meet your needs, on time, and on budget.

Our Applications and Project Engineers will work with you to implement the best, most cost effective solutions possible. Our organization is available to you 24 hours a day, seven days a week and will travel the world to install, maintain, and upgrade your systems.

At Innovative Electronics, "**Quality by Design, Satisfaction by Performance**" is not just a tag line, it's our business philosophy.

For Additional Information Contact:



P.O. Box 1367, Stafford, Texas 77497 U.S.A. • Phone: (281) 240-7355 • Fax: (281) 240-7356
www.innelect.com E-mail: sales@innelect.com Div. of Lucere, LLC BallastA4 Rev. 03/25/02