**Author(s)**

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NI Product(s) Used

LabVIEW, CompactRIO

Category

Industrial Machinery &
Control;
Electronics &
Semiconductor;
Energy;
RF, Wireless & Mobile
Communications;

Payout Tension Meter System (PTMS)

The Challenge:

Creating a system to monitor the stress or tension of the anchor or work wire cables when deploying it to ensure that it does not exceed the allowable design limit.

The solution:

Using LabVIEW as the graphical development environment that integrates with NI CompactRIO as a controller to process the raw data before showed the actual data in HMI, proximity sensor used to measure wire cables of anchor either pay in or pay out and load pin sensor used to measure the tension of wire cable.

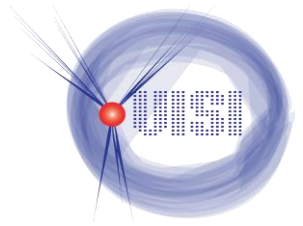
Who Are We:

Virtual Instrument & System Innovation (VISI) is a Malaysia-based NI Alliance Partner (Silver) that specializes in engineering system development and integration. We build customized engineering solutions based on specific and individual user requirements and specifications. To date, we have built and deliver various industrial automation, remote monitoring and test & measurement systems nationwide. Our core competency is focusing on utilizing software and hardware tools from National Instruments (NI). With these skills and competency, VISI has successfully penetrated several key industries including Marine & Offshore, Manufacturing, Aerospace, Energy and R&D.

System Overview:

Payout and Tension Meter System (PTMS) has been in the industry for decades. Most of these systems are either using direct electrical control of the motors or at most, PLC's to integrate the sensors and feedback the values back to the user via a HMI. As the technology evolves rapidly, the need for a newer generation system becomes more and more in-demand. Upon a request by our long-time client, we have developed an upgraded version of the PTMS and incorporating these requirements:

- Data logging and history trending – To meet today's legal and regulatory requirements, the system must be able to plot the data over a time-chart and log these data for later reference,
- Limit alarms and indicators – As the application becomes more complex and demanding, this becomes an important feature to have to prevent accidents from happening,
- Modularity – The vessels serving the marine and oil and gas industry comes in various types and sizes and it is economically essential that the system can cater for most types,
- Calibration audit – Besides having the alarms, it is also important to track the calibration parameters of the sensors and who and when the changes were made.



By taking the advantage of the unrivaled performance, ruggedness and flexibility of the CompactRIO platform, we could develop this system in a very timely manner. Besides the controller, other components in PTMS are:

- **Human Machine Interface (HMI)** – Developed using LabVIEW, the HMI program receives the process data from the CompactRIO and provide a complete real-time view of the condition wire cable tension. Besides being interactive and user-friendly, the interface program must minimize the learning curve required to operate the system.
- **Proximity Sensor** – Two proximity sensors are used to determine and measure the wire cables of anchor either pay-in and pay-out direction of a system. It obtains the direction of rotation by evaluating the sequence and simultaneous pulse and trigger of both sensors within milliseconds. Pulses generated by the cable in contact with the linear measurement of the pulley.
- **Load Pin Sensor** – A load pin is a strain gauge based that senses the force or tension applied across the anchor, via cable installed on the pulley. It has two grooves which machined into the outer circumference of the pin to define its shear planes, which are located between where the tension being applied.
- **Pulley** – The pulley system customized to meet the specific requirements of the specific vessel required. It is in house design of the mechanical pulley with proximity sensor and load pin sensor.

Conclusion

Overall, the flexibility of LabVIEW and CompactRIO have showed that we can iterate on design without scrapping all our previous projects. As we know, LabVIEW is a graphical programming language that uses a dataflow model instead of sequential lines of text code, empowering you to write functional code using a visual layout that resembles your thought process.

So by using LabVIEW, it helped our engineers spend less time worrying about semicolons and syntax and more time solving the problems that matter.

With an integrated, flexible, software-designed instrument engineers can customize the information available for pay in and payout operation easily either for upgrades or maintenance in future. This approach improves PTM system monitoring more reliable and reduce time required. Additionally, with the advanced processing power of CompactRIO, PTM System can easily maintain its data information and manage the problems that may occur in future.

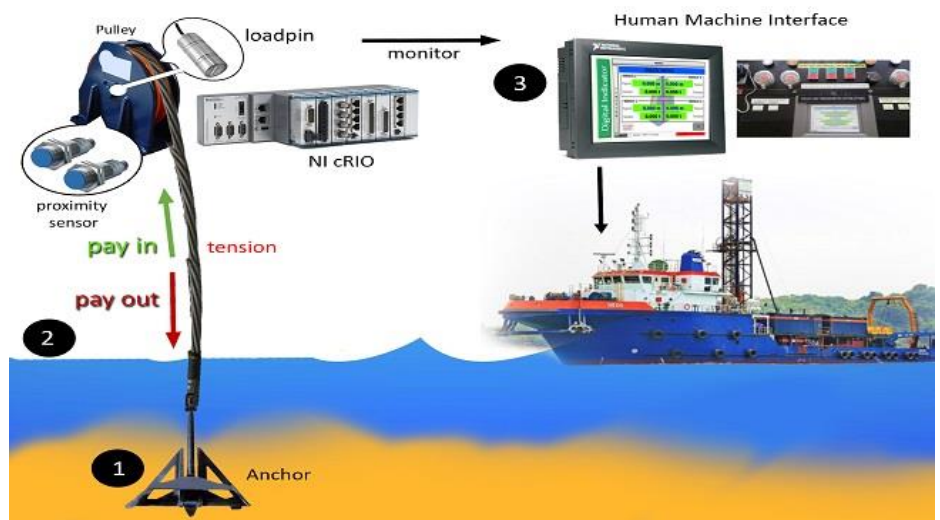


Figure 1: System Diagram