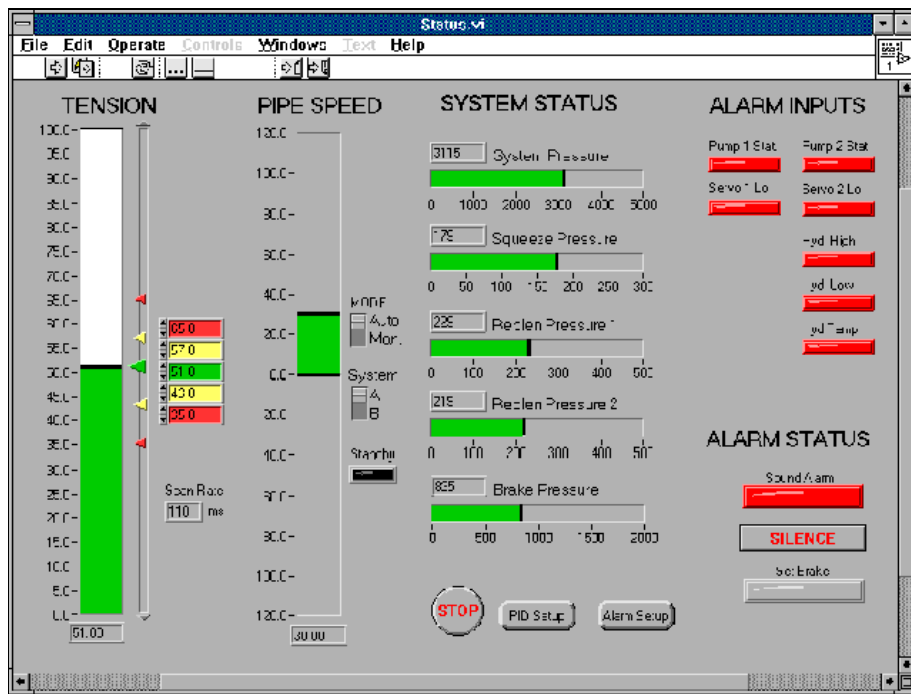


**The Problem:**

Pipe being laid on the ocean floor needs to be dynamically controlled within a certain tension range as the pipe laying barge rides up and down on ocean swells or is winched head after welding on a new section. If the tension drops too low it will buckle under its own weight as it drops 1000 feet or more to the ocean floor and spans up to a mile in the process. If the tension gets too high, the pipe already laid can get dragged along the ocean floor or even pulled apart. The customer needed software to control the pipe tension using a 100 ton hydraulic tensioner and to monitor various system parameters such as hydraulic temperature and pressure.

**The Solution:**

A PID or proportional integral differential control system was developed in LabVIEW using a National Instrument's PID VI's and a 64 channel analog data acquisition card. System parameters are displayed using customized bar graphs that change color if they go beyond a user defined range. PID control parameters, fail-safe limits and alarm levels are controlled from separate panels that can only be accessed if the user knows the password. The tension setpoint and upper and lower zero band range, however, can be controlled from the main front panel using an "intelligent" multi-button slider control. This allows the user to increase the setpoint tension when the barge is in deep water or to increase the zero band range to keep the pipe from moving while the welders are working unless a large swell causes the tension to exceed the zero band limits.



**Hardware Used:**  
AT-MIO-64-E2

**Software Used:**  
National Instruments LabVIEW  
National Instruments PID Control Toolkit