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PLC Based Hydraulic Safety Shutdown System for Well-Head Controls

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***Abstract*—The advancements in technology are pushing the boundaries of what is possible with Programmable Logic Controllers (PLC). The increase in demand for Wellhead automation, high availability and reliabilities of PLC's have shifted the conventional norm of controlling Wellhead and top-side valves into PLC based Hydraulic safety systems.**

The objective of this paper is to explore the benefits of integrated PLC based Hydraulic Safety Shutdown Systems (HSSS) over conventional.

***Index Terms*—WHCP, HSSS, PLC.**

I. Introduction

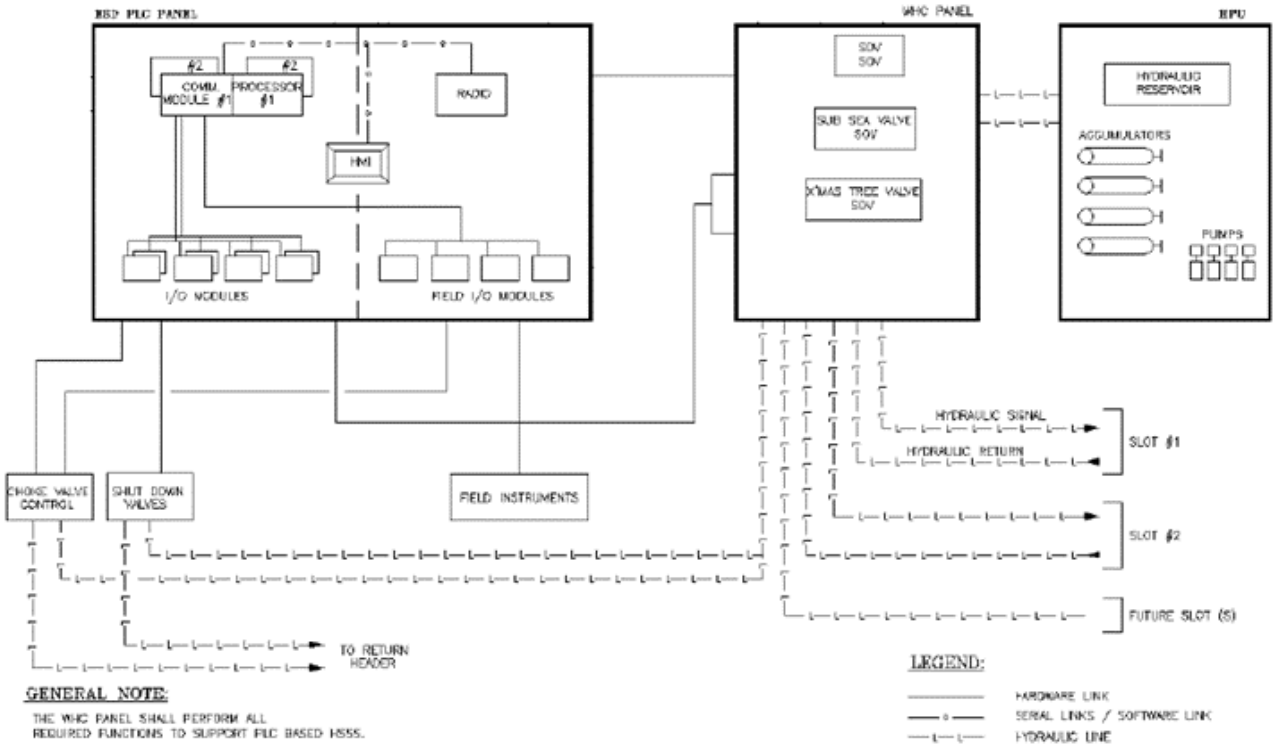
Hydraulic and Pneumatic Well Head Control Panels (WHCP) have been used for years to control Wellhead valves (such as Subsurface Safety Valves, Surface Safety Valves, Wing valves) and other topside Shutdown valves (ZV/SDV/SV) using pressure pilots/switches. They are designed to detect abnormal operating conditions and trigger immediate shutdown procedures to prevent catastrophic failures. Pilots/switches, local indicating and other control devices are replaced by smart electronic devices and connected to PLC's forming an integrated PLC based Hydraulic Safety Shutdown Systems (HSSS). Local controls are shifted to programmable software configuration inside the PLC processors.

II. Results and Observations

PLC based Hydraulic Safety Shutdown Systems (HSSS) are proven in wellhead control applications in oil & gas sector. Selection of a PLC product with required SIL rating is an essential factor to achieve reliability, availability and seamless integration with platform control & monitoring systems.

Offshore oil and gas producers are always looking for continual improvement in their processes to maximize production with cost effective solutions. PLC based Hydraulic Safety Shutdown Systems (HSSS) bring greater flexibility, simpler logic modifications and reduces mechanical failures of components there by increasing availability. Local HMI displays on the PLC panels help operators to monitor the process conditions in turn saving considerable time during start-up, commissioning and maintenance.

PLC based Hydraulic Safety Shutdown Systems (HSSS) have reduced footprint, more efficient, enhanced robustness and diagnostics, which is an interest to all operators. Smart electronic transmitters with higher Safety Integrity Levels increase reliability and safety availability of the protective



loop functions.

Many vendors in Middle East region are keen to offer integrated PLC based Hydraulic Safety Shutdown Systems (HSSS) with higher safety integrity levels. A SIL3 certified PLC based Hydraulic Safety Shutdown Systems (HSSS) would be sufficient for all wellhead control & protective functions and the need of independent, dedicated systems for Fire & Gas / high pressure protection systems may be avoided in offshore wellhead platforms.

III. SUMMARY

The increase in demand for wellhead automation and push for integrated combined control & safety systems, this paper outlines the benefits of a PLC based Hydraulic Safety Shutdown Systems (HSSS) and explore the possibilities of combining all control & protective functions into a single system for offshore wellhead platforms.