Through the Looking Glass - BBB (Borrow)
Human-Machine Interface Design for Process Control Applications
By Jean-Yves Fiset
Reviewed by Nick Sands

The operator interface to the control system has been listed as a contributing factor in several major incidents. Until recently, there have been few books on the subject of control system human machine interface (HMI) design. One of the books published in the last year is Human-Machine Interface Design for Process Control Applications, by Jean-Yves Fiset. Fiset is president of Systèmes Humains-Machines Inc. He has a PhD from École Polytechnique de Montréal and nearly 30 years of experience, including several years with Atomic Energy of Canada specializing in human-machine interfaces, automated emergency operating procedures and control rooms.

The first chapters introduce the challenge and benefit of successful HMI design. Modern plants with modern control systems can overwhelm an operator without a well designed HMI. Fiset advocates the user centered design process. It is important to note that this does not mean just give the users what they want, but rather to understand the tasks the users must perform and to provide an interface that assists in the execution of those tasks. Fiset uses examples to illustrate the process for designing a new HMI, including a plan, schedule, task analysis, requirements, specification, documentation, and initial designs. Several design tips are also included.

The next chapters cover the development of an HMI specification and the evaluation of a design against the requirements. Fiset includes an example outline for a specification and references related guidelines. The specification may be developed by evaluating mock-ups of the HMI. Two of the evaluation methods discussed are heuristic evaluation and usability testing. Heuristic evaluations test the HMI design against good practice. Usability testing checks the performance of the design through simulated tasks.

Fiset also describes methods to improve an existing HMI, with or without a design basis. If there is a design basis, the improvement process focuses on using capabilities and addressing learning identified from the operation of the current system. The ideal improvement process is continuous. Without design basis, the process looks more like the process of design of a new HMI, with the identification of tasks and documenting the specification. There is a brief discussion on adapting displays to different types of processes, such as continuous, batch, and discrete. The process does not change, though the user tasks may.

The final chapters cover the design of the broader HMI. One aspect is the integration of different components into an HMI, including panels and wireless devices. Another aspect is the design of the control room itself, including the decisions on which stations and equipment are adjacent. Fiset includes operating procedures in the HMI, and discusses their development and validation. An appendix provides advice on when to use different components, including large display screens, annunciators, and display techniques.

Many sites can benefit from improved guidance on the development and improvement of the operator interface. Fiset provides a process for HMI design, but very little in the way of display techniques themselves. *Human-Machine Interface Design for Process Control Applications* is a 20,000 ft view of HMI design. While it is worth reading, making it a borrow (BBB), there are other books that can provide more details of design. It is available from ISA for $79, (member price).