

**White Paper written for
World Batch Forum
June 2004**



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White Paper S88 for Production Managers

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It is hard to tell when a new technology is ready for prime time. Embracing a new technology too early is expensive, disruptive and, usually, a grave disappointment. Waiting too long gives competitors an unacceptable advantage. History is full of new technologies that looked good early on and turned out to be fools gold. In the eighties and even earlier, process automation looked like a sea change in manufacturing. A lot of processes were “automated” during that period. Some provided significant benefit. More did not. They were complex, expensive, difficult to keep attuned to the needs of the process, and too often were monuments to brilliant engineering that either missed the point or provided too much or too little real automation. Many of us started too early. It is appropriate to blame some of our less than stellar success on timing, but it is also important to honestly accept that many of the early failures were due, not to deficiencies in the technology, but to vague understanding of what we were trying to accomplish with automation. Equally important, we often didn’t make clear what automation should *not* do. Automation systems are not equipment that is purchased and put in place like a tank or a forklift. They are created to solve specific production problems and to provide specific process capabilities. Although equipment and software was less sophisticated early on, the primary problem was that we didn’t realize how important it was to align the automation approach with the business needs driving the process.

The good news is that process automation has matured. The equipment and the software are better and more affordable. There are even standards in place now as well as many good automation products on the market that are based on those standards. Process automation technology is ready for prime time. The bad news is that today’s automation can still be unsuccessful if production management doesn’t clearly define what is needed in a way that the engineering world can understand. Having said that, some responses are predictable; “I can’t contribute – I don’t understand all that electronic gimmickry”, or “I don’t have time to learn how to do automation, it is like space ships and computer magic, we have engineers for that” or other renditions of the same concerns. Well, on that issue, there is good news

without the bad. You no longer have to learn the technology. You don't have to learn how to configure and install an automation system. Actually, the process and everyone concerned is probably better off if you don't, but you do need to learn how to describe what is needed clearly and with great precision. A production manager's job is to make product using the people and equipment at his or her disposal. In order to do that properly, a manager must clearly define exactly how that process should be managed and operated. The main thing a manager needs to learn when dealing with automation is how to define these things precisely in a way that everyone from the operator to the engineer can understand. It sounds easy. It really isn't, but there is help available.

The batch control standard (generally called S88) describes categories of building blocks that are defined functionally. It describes low-level building blocks or modules (called control modules and equipment modules) that need to be carefully defined according to the function they serve. Those smaller modules are assembled to build larger modules (called units and process cells) that have much more complex functionality. That functionality also needs to be defined. Definition of *function* is the key. The nice thing about dealing with functional definition is that it doesn't matter how the function is carried out. Material addition, for example, is exactly the same function whether carried out by automated equipment or by a person emptying bags into a tank. The details of how material is added are an engineering issue. The fact that it must be added is an operational issue and good definition of all operational requirements is essential. Once the process is defined in terms of the various types of modules and the function of each module is clearly defined, it is much easier to make rational judgments about automation. Should a given function be automated or not? If so, what level of precision is needed? What data needs to be collected for each function? Are there high priority functions that need to be addressed immediately with automation of other parts of the process to be considered later as time and money allow? What functions do people do better than an automation system? Many decisions have to be made and, because they bear on how the process will be managed and operated, production management really needs to be involved in each decision. Because those judgments shape the defined function of specific modules, it is also vital that everyone — operator, manager and engineer — can understand exactly what is meant. For success, the production manager must be directly involved. No one else knows as much about business requirements and the way the process should be operated. Whether we like it or not, automation tends to define operator's jobs. That is not something that ethically can be left to engineers to decide alone. Done properly, however, there is a decidedly lower chance of getting too much or too little automation and the automation that results is more likely to work smoothly with manual activities, to make the process run better and to make it run more predictably.

This sounds like a lot of work, and it is, but it is worth the time and effort. There will be few opportunities for a manager to have greater impact on the way a process will run on an ongoing basis. Automation, properly done, gives a manager many tools to control the way a plant operates. Most processes have control that measures, sets and manipulates things like temperature, pressure, flow rates, etc. Process automation goes well beyond that and takes charge of the order in which actions take place for a given product based on a formal schedule and a recipe for each product. Process automation ties management input together with modular automatic and manual control in a way that allows better operation and better management of the process. Automation usually increases throughput and almost always reduces variation, contributing to more uniform product and more predictable timing of modular operations. Often more important, precise and repeatable timing enables much more precise scheduling and enables all of the benefits that flow from that. On a given day, for

example, any process may need to be optimised for one of several possible objectives. The objectives might be throughput, operating cost, inventory control or some combination of these and other factors. A workable and precise schedule allows this kind of optimisation to be managed as business requirements change. It is the manager's responsibility to ensure that the systems, both automatic and manual, are flexible enough and precise enough to meet all likely business requirements. This is only one of the reasons the manager needs to be directly involved with the definition of any automation plan within his or her scope of responsibility.

If a manager's role is so central, how does a manager learn what he or she needs to know in order to properly define process automation? The first step is to understand the standards. The most obvious and important one is S88 or **Batch Control**. It provides both the concepts needed and the terminology needed to communicate them. The title sounds like it excludes continuous processes, but it really doesn't. In spite of differences, the management principles are almost identical. The standard is usually called S88 but is, officially, ANSI/ISA88.00.01. It can be obtained from ISA for a price (www.isa.org). An international version, also titled *Batch Control*, is almost identical and can be obtained, complete with a French translation, from the International Electrotechnical Commission (www.iec.ch/catlg-e.htm). There are also books. Unfortunately none are targeted specifically to managers but two of the more readable books on the subject are not exclusively technical in their approach. They are listed in the bibliography. It may also be a little easier to wade into the detail of the standard by attending a conference where it is possible to talk to people who have done or are doing the same thing. The World Batch Forum (wbf.org) is one of the few professional organizations focusing on the operation and control of process manufacturing facilities. It conducts annual conferences in both North America and Europe. There are usually tutorials for those who are relatively new to the topics and two days or so of very worthwhile presentations on applications issues and related topics. The organization also conducts web conferences and tutorials on the subject. Regardless of the method a manager chooses, at the end of the day it is only important that he or she master the rudiments well enough to ensure that automation is defined functionally and precisely and that a common language exists between the people who define what is to be done, the people who must figure out how to make it happen and the people who must use it.

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