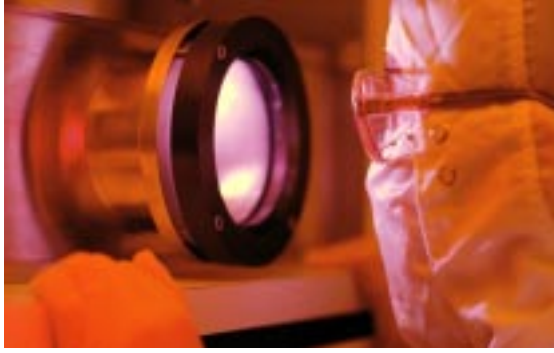
Optimal Fab Operation Design

There's More to Operation Design than Meets the Eye



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In the manufacturing and business worlds, the term "operation" encompasses all the resources and activities needed to achieve a company's objectives. Setting up an operation correctly requires specific elements, elements that become the cornerstone of a well-designed operation. The only way to transform a company into an world-class organization is to design and define all of these elements with a sharp focus on the company mission and its objectives.

Many companies focus primarily on the physical elements of the fab operation, such as layout, tools, material and staff. The importance of good design for those elements is obvious-a new facility requires a good layout. A tool list is based on accurate capacity models and adequate staffing.

There are, however, other elements that are key to the operation but tend to be overlooked in the initial design phase. This situation is very common in the semiconductor industry, which is driven by technology and expensive facilities with exponentially priced equipment.

Often, the neglected areas end up being the "soft" elements of the operation. Areas such as business processes, work methods, and job definitions. These elements are essential for both new and existing organizations. Their development, though, tends to be based on constraints, company history, power balance, and some limited structural design.

Key Elements of Fab Operations Design

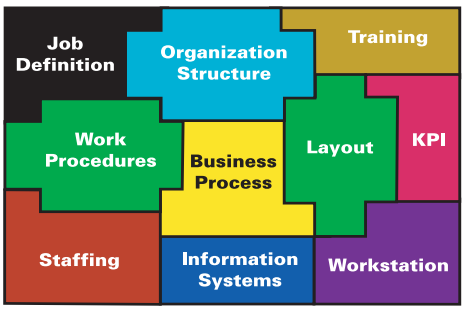

Fig. 1 Elements of a successful operations design

What elements make up a well-planned operation for a fab? Often times it can seem hard to define. Clear job responsibilities, business processes, work procedures, key performance indicators (KPIs), information systems, staffing, and training are all-important.

There are many stages to the successful design of an operation. The first step is to define the company objectives. Clearly defined objectives will help build a road map to productivity and success. First, identify the specific departments within the organization and the areas of responsibility for all functions of the operation. Those areas will include manufacturing, maintenance, engineering, planning & control, and facilities, among others.

The next step is to define the responsibilities of each job. Focus on essential jobs within the organization and develop a job description for each. Consider the job's areas of responsibility and what qualifications are needed for the position. Determine what authority the person doing the job should have and develop a basic structure for reports and meetings.

Define what type and how many staff is needed for each function and for each phase of the ramp plan. Then develop a recruiting and training plan based upon those requirements. Designing key performance indicators (KPI) that support the main goals of the organization help manage and track productivity. Managers can develop such indicators by defining what to measure, how to measure it, and what action is required of each different process. Then create management reports to assess the results.

Next define business processes within the organization. Start by asking these questions for each process:

- What needs to happen?
- When does it need to take place?
- Where should it take place?
- How should it happen?
- What information is required?
- How should we monitor and control the process?
- How can this operation improve the overall performance?

Business processes cover many areas, including material management, production planning, production control, manufacturing, maintenance, facilities, sales and distribution, engineering, quality management, information systems, and disaster recovery procedures. In addition, we should consider how products would be transferred from development to manufacturing.

Together with business processes, creating clear work procedures is a good way to boost efficiency. Create a set of procedures for the entire organization based on the best known methods in the industry. Examples for work procedures are: a closing check list, a procedure for manual operation when automated systems fail, a tenant improvement request, and shift change procedures. Procedures for wafer start scheduling, yield lost investigations, inventory cycle count, lot transportation and staging and tool preparation are just a few of the procedures that should also be designed.

No operation design will function well without the right type of information system in place. What systems does your company need? Possibilities include MES, ERP, supply chain management, maintenance management, exception management, yield management, and document control systems. Do the research necessary to make sure the operation has the information system support it needs.

When we consider the "soft" side of operation design, the result is a business that functions smoothly and efficiently. Taking business processes, job definitions, and related elements into account means a more successful fab operation from the bottom up. ■