

Organization

This chapter covers the following topics:

- *Organization of industrial control groups*
- *Typical job titles and descriptions*
- *Management and engineering job descriptions*
- *Maintenance job descriptions*

Overview

Individuals need to be organized when they are put together to perform certain functions, such as engineering a new plant or maintaining an existing plant. These assembled individuals could form a permanent group in an industrial control department, all of whom are dedicated to that discipline, or could be part of a team assembled for a limited time to implement a project with individuals coming from different disciplines.

Unorganized permanent groups or temporary teams are prone to misunderstandings and chaos because personalities may clash and egos may get bruised, all leading to poor performance. Defining the organization is vital for its efficient and productive operation. This is an activity that is performed by a manager and needs to be done before the individuals are assembled and start working together. Therefore, a group or team ready to implement and maintain industrial control systems needs to be “organized”.

Organizations are structured social entities as they are composed of people. They are created to achieve certain goals, most often related to making a company profitable, and are linked to the “outside world” as they take input(s) and give output(s).

Unless, “the organization” consists of one-person, relationships between its members must be stated and understood to avoid internal disagreements, misunderstandings, and conflicts. Knowing where everyone in the organization stands reduces interrelationship problems. Job titles,

job descriptions, and organization charts are needed in most organizations (departmental groups or project teams) to define authorities and responsibilities.

The structure of organizations varies widely. These structures are created to fit the operation and culture of the company or plant. This chapter will describe the most common types: hierarchical, flat, and hybrid.

The organization of industrial control groups in the workplace will vary according to:

- The group size, as large groups tend to be more hierarchical
- The company culture, which varies according to company history, geographical location, and country culture
- The nature of the work to be done, since a group that does one project at a time will need to be managed differently than a group that handles a multitude of projects simultaneously

One of the first steps for a department manager, as the organization chart is being created, is to obtain or create job descriptions for all positions in the group. If the positions are for a specific project, the project manager will create an organization chart for the group (for more on this topic, see Chapter 9).

Job descriptions are written so that members of the group and candidates filling a position clearly understand what they are expected to do, avoiding unpleasant surprises and misunderstandings. In addition, where personnel are hired rather than reassigned from within the company, job descriptions help a recruiter for a position discuss any concerns a potential candidate may have.

Examples of typical job descriptions are shown at the end of this chapter. Job descriptions should identify:

- Job title
- Who that person reports to
- Primary functions of the job (this should include the job's authorities and responsibilities)
- Education and experience required to qualify for this position

In addition, some job descriptions may include working conditions, special requirements such as having a driver's license, the expected amount

of travel required, the ability to lift and carry up to a certain weight, willingness to work outdoors in cold or hot weather conditions, and so on.

Organization of Industrial Control Groups

Before starting the topic of Organization, the author wants to address internal conflicts within a group. One of the most difficult job responsibilities of a manager is resolving conflicts, and it often requires special training. Courses in conflict resolution and mediation are available and, in the author's opinion, should be provided to all persons in supervisory and management positions. The manager should be able to get to the root reason(s) of a conflict and preferably let the parties involved reach a decision to resolve the conflict by themselves; that is, the manager should act as a mediator rather than imposing his/her authority and forcing his/her decision on the parties in conflict. However, when the parties cannot reach a decision the manager should impose his/her authority and explain to the parties the reason behind his/her decision.

When preparing to organize for a control group, the manager should identify:

- First, what the structure will look like; this will be shown in the organization chart.
- Second, what the required responsibilities and authority are for each position; these will be shown in the job descriptions.

The information shown in these two documents establishes the official lines of communication between the different individuals of the industrial control group, their roles, their relationships to plant management and the range of their authorities and responsibilities.

The organization chart gives the first introduction to the group structure (see the example in Figure 1-1), providing the hierarchal relationships between the members of the control group. The information presented in Figure 1-1 is applicable to an industrial control engineering group but its format could apply to other organizations as well. Most industrial facilities and engineering organizations have a clear written organizational structure that shows the interrelationships between management, technical staff, operation personnel, maintenance personnel, and other support staff.

Organizations also have an unofficial and unwritten organizational structure. This unofficial structure takes time to form and is generally

developed based on the personalities of the group members, their relationships, their knowledge, their work experience and their responsibilities. This unofficial structure should be tactfully discouraged by the group manager as it often leads to internal conflicts.

The organization chart in Figure 1-1 shows an example of a departmental group consisting of sixteen people. The group consists of a manager, two chief control engineers and three senior control engineers. That group also has five control engineers and five control engineering technicians/technicians.

The reader will notice that the organization as shown in Figure 1-1 is a flat one, meaning that all members of the organization report directly to the manager. A simpler flat organization (e.g., for a small group) is shown in Figure 1-2. The other common kind of organization structure is the hierarchal (also called pyramid) type and is shown in Figure 1-3. This is an approach commonly used in many corporations and in the military. As to which approach is best is still an open debate.

Figure 1-1. Example of an organization chart for an industrial control engineering group

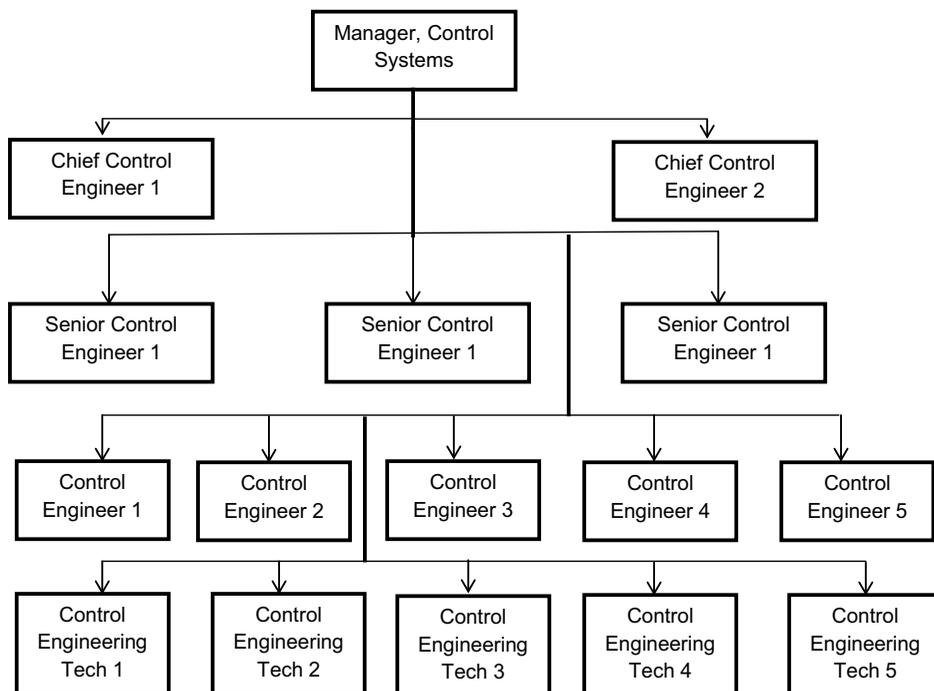


Figure 1-2. Typical flat organization

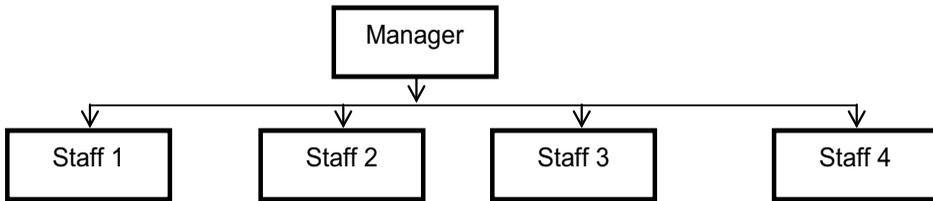
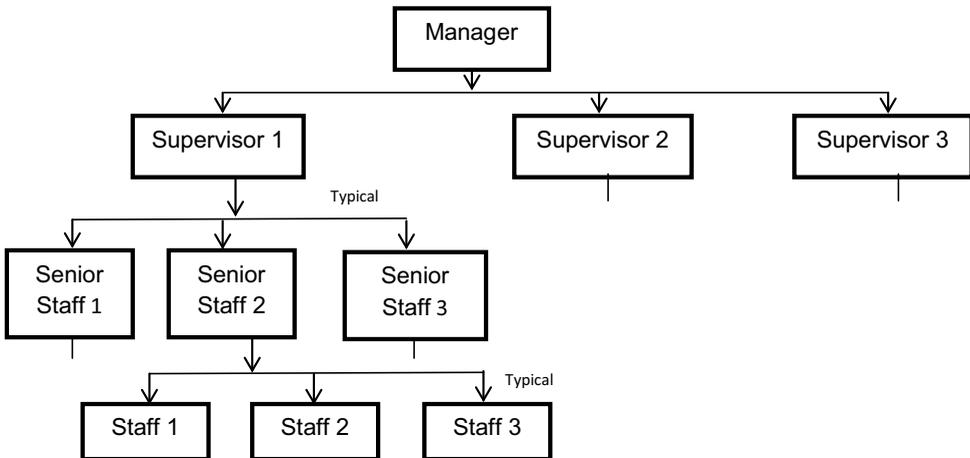


Figure 1-3. Typical hierarchical/pyramid organization



The author's personal experience with flat organizations has demonstrated their efficient operation. The author believes that when group members are more empowered by the organization (as a result of the flat organization), they tend to be more productive, with improved morale and job satisfaction, making decisions and implementing them in a lot less time, all of which benefits the employees and the company. It should be noted at this point that job satisfaction is, for any professional, as important as income. With pride in their work, group members cultivate an improved company culture. More on the topic of flat organizations is addressed at the end of this chapter under Real-Life Example.

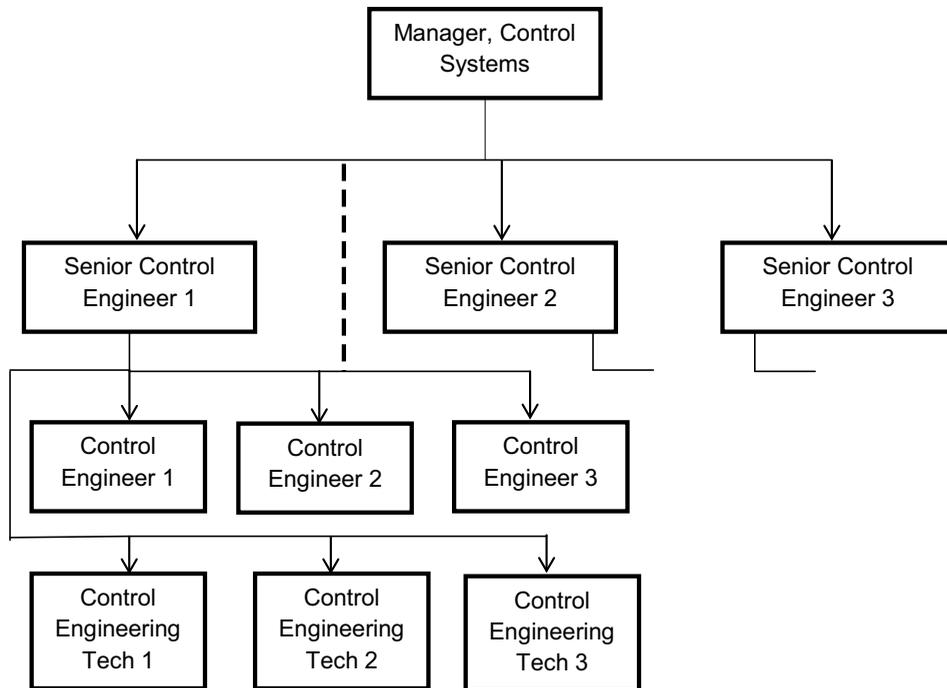
Some corporations have taken an approach where a combination of both structures has been implemented. This is done by reducing the middle management to a minimum. Such a hybrid organization (with an example shown in Figure 1-4) shows three senior engineers reporting to a manager. Each senior engineer, in turn, is functionally responsible for a group of engineers and techs. However, the manager is still responsible

for the administration of the whole department as shown by the dotted line.

Regardless of which organization style is implemented, a manager must:

- Take care of his/her staff so that they can take care of the company.
- Understand the needs of his/her staff, which include fair remuneration and ongoing support.

Figure 1-4. Example of a hybrid organization chart for an engineering group



Every organization needs to decide which of the three common organizational structures (flat, hierarchical, or hybrid) is best suited for its culture, group size and work to be done. What counts at the end is an efficient workforce, achieved through good group morale, good quality of work and the ability to complete the work on time and within the allocated budget.

When a project is started, and a project team is assembled, a project organization chart is often put together that will show, for example, con-

trol engineers and techs reporting to a senior engineer. Once the project is completed, these lines of authority are redefined to meet the needs of another project.

Engineers and techs working on more than one project will often be reporting to two (or even more) senior engineers. It all depends on the size of the project and the time frame available to complete it. Sharing human resources between two projects may lead to conflicts. However, good working relationships and a scheduled approach to time sharing should help reduce the potential for conflicts.

Outsourcing

Some companies have thought of, or actually implemented, outsourcing in which a third party located nearby or even continents away provides some of the services that a department may need. An example is drafting services, where the core engineering is done in the home office and all drafting is contracted to a third party. There are reasons why such an approach may be forced onto a department. It could be the result of mergers or acquisitions, or for financial reasons when a number of people are let go as they may be considered to be supporting “non-core” functions. This approach has its advantages and disadvantages.

The advantages include cost savings, less personnel commitment (i.e., salaries) for companies, and the advantage of having people available only on demand with no worries about their workload. The disadvantages include the loss of some control on the standardization of work, the absence of employee loyalty, and most importantly, the loss of knowledge and experience if the organization chooses to later reinstate the outsourced activity, because it will have to go through a learning curve with its extra time and expenses.

The author’s personal opinion is that one of the main disadvantages of letting personnel go to be replaced by outsourced (and often lower paid people) is that a loss of morale creeps into the remaining employees, who wonder if they are next.

Organizational Changes

External forces often compel businesses, and therefore their managers, to rethink their organizational structure or even their staff. Such forces could be:

- Competitive

- Technological
- Economic
- Governmental

Competitive forces, either domestic or global, demand a constant awareness from management to keep up with the competition – to grow, certainly, but mainly to survive. With the growth of the global market, opportunities have grown and with it, global competition – more opportunities but also more threats. Changes in the nature and amount of competition will force speedy changes onto a business because it is a matter of survival.

Technological forces such as new products or improved manufacturing processes have forced companies to rethink their operations. On the positive side, improved communication technology has allowed employees to better balance their work and personal lives in today's hectic daily schedule for a typical family. Some corporations have adapted while others have been reluctant to adjust. Improved communication has led to work-from-home, flex-time, compressed work-week and other organizational changes that allow people to be responsible for their own work schedule. And why not, as long as the work gets done; however, this approach will not work for some positions that require direct, face-to-face interpersonal contacts.

Economic forces are basically related to the company's financial strength and to the local and world financial markets. As a result of these forces, downsizing often occurs. The old ideal of life-time employment is gone. Employment no longer means job security, and temporary work arrangements are a lot more common than they were a generation or two ago. As corporations now focus primarily on improving their bottom line, they adjust their businesses to meet short-term goals. They are forced to do so to remain attractive to investors, who otherwise will move their investments to another company that will reward them better. This short-term corporate planning has led employees to continuously rethink what skills they can offer to the marketplace – an issue a manager must always keep in mind to avoid losing members of his/her group.

Governmental forces stemming from changing laws and increased regulation have led many corporations to review their operations and strategies for both the short and long term. In addition, governments have implemented more rules on how employers must treat their employees, such as pay equality between men and women.

In spite of the external forces pressuring companies to change, many will not. This is mainly due to bureaucratic cultures that prevent companies from reorganizing or to management structures that threaten certain key personnel in positions of power because they fear losing their status and income. This short-term refusal to change often eventually leads to the demise of companies.

Typical Job Titles and Descriptions

The definition of authority and responsibility for the personnel involved in an industrial control group should be developed by the manager in parallel with the organization chart and reflected in job titles and descriptions. This definition must be in the form of a written document rather than a verbal understanding. More on job descriptions is covered in Chapter 2 under “Recruitment and Selection.”

In this chapter, the following typical job positions are divided into two groups:

- Management and Engineering (see Figure 1-5)
- Maintenance (see Figure 1-6)

The reason behind this division is that within a corporation that owns many plants, management and engineering are often shared among these plants, whereas maintenance tends to be dedicated to a specific industrial facility. However, this is a generalization and such a division needs to be modified to suit the individual needs of facilities.

Where contract engineering organizations or individual contractors are added to a project team, an engineering specification or a scope of work definition is usually the tool that describes the job requirements. The author was, for many years, working as an individual engineering contractor and in most cases, the scope of work definition was a one-liner in the purchase order he received, such as “Engineer to implement process control requirements.”

This chapter will not cover the job titles and descriptions of personnel involved in the marketing and sales of industrial controls. These are normally covered under separate training and implementation manuals and courses.

The following job descriptions are general. In practice, they will vary depending on the company culture and size, production needs and the complexity of the assignments and responsibilities – regardless of

whether they are for a large (or small) corporate central engineering group, or a contract engineering organization, or a plant.

The author has identified the most common job descriptions, recognizing that not all have been covered. It is the responsibility of an industrial control department manager to ensure that a job description exists for every position within his/her group.

In addition, the author has shown in the job descriptions that members of the group report to their department manager – that is, in a flat organization structure. This will obviously be modified for a hierarchical organization.

Management and Engineering Job Descriptions

The following pages show examples of five management and engineering job descriptions.

Figure 1-5. Management and engineering job descriptions

- **Manager, Control Systems**
- **Chief Control Engineer**
- **Senior Control Engineer**
- **Control Engineer**
- **Control Engineering Technologist/Technician**

Title: MANAGER, CONTROL SYSTEMS

Reports to:

Engineering Manager

Primary Functions:

Responsible for all departmental activities for control engineering, including:

- Receiving instruction from his/her superior and communicating them to his/her group
- Monitoring group assignments
- Defining and reporting activities and needs to management
- Resolving conflicts within the department
- Communicating effectively
- Maintaining liaisons with other departments/sections to coordinate work assignments
- Providing administrative and technical support to other departments
- Recruiting
- Assigning and scheduling projects within the department
- Evaluating employee performance and reviewing salaries
- Managing the development of a training program
- Making decisions on crucial or complex project activities
- Supervising all departmental personnel (as appropriate for the organizational structure)
- Motivating group members
- Preparing departmental budgets, forecasts, and goals
- Generating the strategies to achieve these goals and assessing the progress towards these goals
- Promoting safety

- Planning and approving budgets for allocation of financial and human resources

Education/Experience:

Bachelor of Science in Engineering with a minimum of 15 to 20 years of experience in:

- Operating with no technical guidance or control
- Industrial control, with a supervisory or managerial background
- Long range and short range planning and coordination
- Policy generation
- Approval of standards

Title: CHIEF CONTROL ENGINEER

Reports to:

Manager, Control Systems

Primary Functions:

Leads project engineering and design for industrial controls, usually supervising a task group of engineers and technicians, including:

- Engineering administrative duties
- Participating in decisions concerning policies
- Staying within budget restraints
- Communicating effectively
- Forecasting manpower requirements
- Having input on decisions concerning staff selection and remuneration
- Monitoring and controlling costs
- Preparing schedules
- Providing training and consulting services
- Assigning and overseeing the generation of standards
- Directing installations and follow-ups
- Making task assignments
- Reviewing technical work
- Troubleshooting as necessary
- Reporting progress to management

Education/Experience:

Bachelor of Science in Engineering with a minimum of 10 to 15 years of experience including some administrative duties. Must be an authority in the field of industrial control technology.

Title: SENIOR CONTROL ENGINEER

Reports to:

Manager, Control Systems

Primary Functions:

Under supervision, coordinates and participates in the engineering and design of industrial control systems as required by the project assignment, including:

- Implementing control requirements from functional guidelines
- Preparing design specifications
- Ensuring compliance with appropriate standards
- Monitoring and controlling costs
- Communicating effectively
- Preparing and maintaining project schedules
- Selecting and procuring systems equipment
- Monitoring and training of engineers assigned to the project
- Reporting progress to management
- Participating in installation and start-ups
- Providing technical support to other departments

Education/Experience:

Bachelor of Science in Engineering with a minimum of 7 to 10 or more years of industrial control experience and with some supervisory experience.

Must be able to perform with little or no supervision.

Title: CONTROL ENGINEER**Reports to:**

Manager, Control Systems

Primary Functions:

Under supervision, participates in the design and planning of control systems as required by the project assignment, including:

- Collecting background information
- Preparing drawings and calculations
- Designing or modifying systems
- Assisting in selection and procurement of equipment
- Ensuring compliance with applicable standards and codes
- Completing assigned tasks on schedule
- Assisting and supervising technicians and designers as needed

Education/Experience:

Bachelor of Science in Engineering with a minimum of 5 years of experience.

Title: CONTROL ENGINEERING TECHNOLOGIST/TECHNICIAN

Reports to:

Manager, Control Systems

Primary Function:

Helps engineers in the design of industrial control systems by providing technical assistance, including:

- Collecting background information
- Performing calculations
- Transmitting information to project team members
- Preparing design specifications
- Checking design documents to ensure compliance with applicable standards and codes
- Preparing diagrams
- Providing technical guidance to technicians with less knowledge
- Preparing requisitions
- Executing necessary tests and collecting data
- Maintaining engineering equipment
- Performing miscellaneous administrative work
- Assisting in testing, field start-up, and training

Work is assigned to solve specific problems and is usually checked at the detail level.

Depending on experience level, technical guidance is generally needed.

Education/Experience:

Depending on the job level and responsibilities, high school diploma with a minimum of 10 years of experience, or technical diploma with a minimum of 5 years of experience.

Maintenance Job Descriptions

The following pages show examples of three maintenance job descriptions.

Figure 1-6. Maintenance job descriptions

- Maintenance Supervisor, Control Systems
- Control System Inspector
- Control Service Specialist

Title: MAINTENANCE SUPERVISOR, CONTROL SYSTEMS

Reports to:

Plant Maintenance Manager

Primary Functions:

Supervises all industrial control maintenance activities at the plant level, including:

- Supervising all industrial control maintenance personnel
- Planning manpower requirements and work assignments
- Maintaining budget allocations
- Evaluating shop and field maintenance procedures
- Ensuring proper maintenance of tools and test equipment
- Training maintenance personnel
- Evaluating employee performance
- Monitoring spare parts inventory
- Assisting other departments' personnel as required

Education/Experience:

High school diploma (trade or technical school preferred) and proven technical competence with a minimum of 10 to 15 years of experience in the maintenance of industrial control systems including a minimum of 7 years in a supervisory function.

Title: CONTROL SYSTEMS INSPECTOR

Reports to:

Maintenance Supervisor, Control Systems

Primary Functions:

Inspects industrial controls for malfunction, troubleshoots control problems and refers maintenance and repair problems to appropriate personnel, which includes:

- Understanding the various engineering diagrams, specifications, and manuals
- Performing inspections of equipment calibrations, installations, tests, and final checkouts
- Analyzing requirements for spare parts and procuring them
- Supervising work of service personnel as required
- Verifying compliance with drawings and specifications

Education/Experience:

High school diploma with a minimum of 10 years of field experience in control systems, of which at least 3 years are in an inspection or supervisory position.

Title: CONTROL SYSTEMS SERVICE SPECIALIST

Reports to:

Foreman, Control Systems

Primary Functions:

Maintains and troubleshoots industrial control equipment and calibrates hardware. Tasks include:

- Maintaining his/her knowledge of equipment to be serviced
- Specializing in specific high technology or complex plant control equipment
- Performing tests to ensure proper functioning of equipment
- Evaluating and assessing available equipment
- Installing and repairing control equipment
- Supervising and assisting less knowledgeable technicians

Education/Experience:

Technical diploma and some technical training in industrial controls, with a minimum of 7 to 10 years of experience.

Real-Life Example: The Case for a Flat Organization

At around 10:00 AM on a Tuesday, the Manager of Engineering walked into my office.

“Good morning, Bill,” he said. “Do you have a few minutes?”

“Good morning, John – yes, of course,” I replied.

“Tell me, how is that audit for our plant in Wilmington coming along?” he asked.

“I have completed the pre-auditing activities and I’m due to go onsite next week,” I said.

“Great,” he said. “Now, on another topic, how about the industrial control standards you’re putting together?”

“I have submitted the proposed standards for comments and I should receive a response in two to three weeks,” I replied.

After a pause, John smiled and said, “Bill, how can I make things easier for getting the standards out?”

I thought for a moment and said, “A conference would be great at speeding up the process.”

He thought for a moment and said, “OK, give me a budget and I’ll talk to Tom.” Tom was my department manager.

“Is there anything else you need, Bill?” he asked.

“No,” I said. “Thanks for your help.”

“OK, Bill – have a nice day,” he said, as he left.

I thought for a moment, reflecting on the discussion I had just had, and understood why this engineering department was one of the most successful this international corporation had. It was mainly due to the ability of the Engineering Manager to walk into the offices of all the senior engineers and department managers inquiring about the progress of their work and offering to help where he could.

The Engineering Manager had about eight department heads reporting to him and twenty-five senior engineers spread over the eight disciplines. His open door policy and direct communication with all key personnel

empowered the employees, who in turn made their utmost effort to produce quality work in budget and on time.

Two days later, Tom walked into my office and said, “Bill, you got the budget for the standards conference. Let me know if you need my help.”

“Thanks, Tom,” I replied.

A few weeks later, the Engineering Manager walked into my office with a copy of my audit report.

“Bill, I see that the Wilmington plant needs to do a lot of upgrades,” he said.

“Yes, they do,” I replied.

“Do you think they’ll do it?”

“I’m not sure,” I replied. “They need funds they don’t have.”

After a thoughtful pause, he looked at me and said, “They have to do the upgrades. I’ll talk to the VP of Operations.”

Again, I was reminded why this engineering department was so effective... and I was lucky to be part of that group.

Note to the reader: *Auditing is discussed in detail in Chapters 14 and 15 and standards development is discussed in detail in Chapter 5.*