

BASSETT MECHANICAL
A CASE STUDY OF IMPLEMENTATION OF ISO-9001:2000

by
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ABSTRACT

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The Implementation of ISO-9001 at Bassett Mechanical

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The purpose of this field problem was to implement ISO-9001:2000 standards into the policies and procedures at Bassett Mechanical. Customers were requiring vendors and subcontractors to obtain certification in order to continue providing products and services. Obtainment of certification was needed to ensure sustained business relations with Bassett Mechanical's existing customers.

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Chapter I

INTRODUCTION

Purpose of Study

Founded in 1936 in Appleton, Wisconsin, Bassett Mechanical is a mechanical contracting and engineering firm with more than 300 employees. In 2000, some of Bassett Mechanical's customers began an initiative requiring its vendors and subcontractors to become certified in ISO standards. Because these customers were some of the largest revenue producers for Bassett Mechanical, implementation and registration of the certificate were imperative. Obtaining certification would streamline how business was conducted and would ensure continued business relations with existing customers. Having possession of the certificate would ultimately make Bassett Mechanical a better company by raising the levels of quality, safety, reliability, and efficiency of both its products and services.

Research Objectives

1. The first objective was to identify requirements needed to become certified in ISO standards. Historical information and current standards were utilized to educate employees about what ISO meant and how it would affect the way Bassett Mechanical conducted business.
2. ISO standards had to be followed, policies and procedures had to be written specific to Bassett Mechanical, and forms had to be streamlined. The engineering department, in particular, required the most amount of attention.
3. Objective three entailed implementation of the ISO policies and procedures. Training was needed for all personnel and internal audits were conducted to ensure guidelines were followed.

Definition of Terms

The following terms are utilized throughout the paper:

ISO – International Organization for Standardization; word derived from the Greek isos, meaning “equal”

ISO-9001:2000 – Quality Management System – Model for quality assurance in design, development, production, installation and servicing (year 2000 revision)

(<http://www.isoeasy.org/faq07.htm>)ⁱ

Assumptions

Years of employee dedication ranged from one month to forty years. The corporate culture had allowed each individual to conduct business (i.e., utilize forms, design and engineer a job, manage a project, respond to customer dissatisfaction, etc.) through the method(s) an individual saw fit. The researcher assumed that obtaining certification and registration in ISO-9001:2000 would allow Bassett Mechanical to continue working with existing customers that required such qualifications. It was also assumed that streamlining Bassett Mechanical’s policies and procedures would make the company more consistent in the quality, safety, reliability, and efficiency of both its products and services that it provided to all customers. Assumptions also included: 1) companies that fail to focus on quality may degenerate in reputation and lose market share, 2) obtaining certification would allow Bassett Mechanical to become more efficient and profitable, and 3) market share would increase as the result of obtaining certification.

Limitations

One limitation was that the employees had never had to follow large-scale guidelines or standards in its sixty-six year history. Obtaining employee participation and acceptance to such a change would be a challenge. Actively soliciting employee input, justifying the need for certification, and having management buy-in would be critical to making the change.

Another limitation was the initial cost of implementation and continual improvement of internal standards to retain certification. The company spent approximately \$60,000 in direct costs, ranging from hiring an outside consultant to paying an external accredited firm to conduct an audit. Indirect costs were not closely tracked and could not be determined. The number of man-hours consumed internally, ranging from the groups of individuals that wrote and approved the policies and procedures to the receptionist that typed them into acceptable formats, was not closely monitored.

Summary

The researcher educated, trained, and facilitated implementation of ISO-9001:2000 standards into Bassett Mechanical's existing policies and procedures. Information about certification was obtained through a review of literature and employee education was conducted. Policies and procedures were written specific to Bassett Mechanical and forms were streamlined. The definitive goal of this research project was to obtain certification and registration in ISO-9001:2000 that would ultimately raise the bar for the quality, safety, reliability, and efficiency of Bassett Mechanical's products and services that it provided to its customers.

Chapter II

HISTORICAL BACKGROUND AND REVIEW OF RELATED LITERATURE

Bassett Mechanical's long success owes much to its history. Originating in Appleton, Wisconsin, in 1936, the company started with one man and a dream. E.W. (Al) Bassett, founder and entrepreneur, began Bassett Refrigeration with a single truck and tools. Small appliance repair was the core business of Bassett Refrigeration for the first few years until World War II began. The company quickly grew from one man to forty workers. It was unionized and hired by Wisconsin shipyards to install air conditioning and refrigeration systems on submarines and patrol boats for the government.

Following the war Al purchased a horse stable that was converted into an office building. Work for the shipyards continued and was primarily targeted toward bulk carriers such as grain, coal, iron, limestone, and the like. In the 1940's and 1950's, when mechanical cooling was introduced into the commercial and industrial sectors, air conditioning was needed in clothing stores and coolers and freezers were abundant in grocery stores.

By 1956 the business had expanded to include design-build engineering capabilities for larger refrigeration systems and hospitals. A sheet metal division was added and the name altered to Bassett Inc. in 1968. Succession of the family business was perpetuated in 1974 when William R. Bassett and a number of employees purchased the company from Al Bassett. The name was changed to what is known today as Bassett Mechanical. Thirty-two employees worked for the company in 1974.

The Business Today

Today Bassett Mechanical is a leader in the industry. It has grown into a mechanical contracting and engineering firm with a customer base exceeding 275 businesses. Two unions represent many of the 300+ employees. Capabilities of the company include engineering, design, fabrication, installation, start-up and maintenance of heating, ventilating, and air conditioning (HVAC) systems, plumbing systems, ammonia and freon refrigeration systems, industrial ventilation systems, metal fabrication and installation, and parts sales. The range of target markets in the commercial and industrial sectors include schools, churches, office buildings, medical facilities and hospitals, printing, plastic and plastic wrap, wood, pulp and paper, marine, manufacturing facilities, cold storage, and food plants.

Bassett Mechanical's customers are found throughout greater Wisconsin and across the continental United States. No matter where the customer is located, the company's reputation and promise is encapsulated in one phrase: "We Answer To You." This promise entails answering to not only the customer, but to the supplier, to the employees, and to the community. Bassett Mechanical answers to its customers with reliable, high-quality and responsibly priced mechanical services. It answers to its employees by fostering an environment where people are proud to share, work hard and provide outstanding solutions for its customers. Bassett Mechanical answers to its vendors with fair business practices and win-win relationships that result in mutual customers receiving the best values and highest quality in the industry. And it answers to its community by maintaining a strong and vibrant workforce that contributes to the communities in which people live, work, worship and learn.

A few of Bassett Mechanical's customers, representing multi-million dollar accounts, began requiring its suppliers and vendors to become certified in ISO standards in order to

continue doing business. Bassett Mechanical, in its efforts to answer to the customer and to further strengthen the working relationship, responded by obtaining certification and registration. Uncertainty about how to accomplish this task; however, ran rampant.

Company Practices

Company policies had been created throughout the years as based on industry standards, professional organizations' suggestions, and board of director's approval. Procedures varied from department-to-department and individual-to-individual, dependent upon the manager' and individual's style, philosophy, and preferences. The company's culture had been one in which individuals and departments were given the autonomy to conduct business as one saw fit, as long as the customer was satisfied and expectations were met or exceeded. As based on these practices, no company-wide standards were established to ensure that all departments were "on the same page."

The sheet metal and fabrication department had a more standardized system in place as compared to other departments. Many of the procedures were routinely and consistently executed on a daily basis due to the job shop setting, industry practices, the apprenticeship program, and the need for cross-training on multiple pieces of equipment to build ductwork, piping systems, and pressure vessels. The engineering departments, however, were less structured. Each individual engineer had a unique way of selling, estimating, and managing jobs. A variety of forms were utilized to accomplish the same task. Routine procedures were not consistently followed by the engineers as there were multiple ways to accomplish the same end result. This would ultimately make obtainment of certification a challenge.

ISO Research

The origins of ISO-9000 began prior to 1968 when the U.S. Department of Defense initiated a standard for quality control – MIL STD 9858. This standard was the basis for the NATO standard (1968) and the 1973 Ministry of Defense (UK) British Standard (BS 5750). (<http://sol.brunel.ac.uk/bola/quality/history.html>)ⁱⁱ. Broad acceptance of the United Kingdom's standard and the Canadian series of national standards known as CSA Z299, as well as various countries well-developed quality management practices, lead to the development of generic quality management standards for worldwide application. In 1979, an ISO technical committee was formed and approved: ISO/TC 176 (ISO Technical Committee 176). This committee targeted quality management and quality assurance. The initial formation consisted of twenty member countries that were actively involved and fourteen other countries that opted to follow the work as observers. By 1986 this committee had completed its first standards and by early 1987 had published the International Standard known as ISO-9001 (<http://www.iso.ch/iso/en/iso9000-14000/tour/wherfrom.html?>)ⁱⁱⁱ. Today there are more than fifty participating countries and approximately twenty observers. The preparation of International Standards is commonly carried out by a number of ISO technical committees.

So what exactly is ISO? ISO is the shortened name for the International Organization for Standardization. The organization, as it is today, is comprised of national standards institutes from 140 countries of various sizes and stages of development from across the world. They strive to achieve technical standards that add value to various business operations. These standards facilitate improvements in quality, safety, reliability, efficiency, compatibility, and interchangeability. The standards also increase the safety and efficiency of the development,

manufacturing and supply of products and services. Trade between countries is made easier by the standards.

ISO's vision is to establish a solid and equitable foundation for the global exchange of goods and services. Its' mission is to promote the development of standardization throughout the world with a view to assist exchange of goods and services internationally. It also attempts to develop cooperation within intellectual, scientific, technological and economic events. This need for standardization is demonstrated in the following examples: 1) Today's economies encourage diverse sources of supply and provide opportunities for expanding markets; 2) International recognition of fair competition and common references is needed; 3) No industry today can claim to be completely independent of components, products, rules of application, etc.; 4) Worldwide communications systems need to be quickly and progressively standardized on a global level (this would promote healthy competition among producers and offer greater innovation, improved productivity and cost-cutting practices); and 5) Emerging technologies have the need for standardization, particularly in the early stages of new technological development (www.iso.org)^{iv} .

Widely accepted ISO standards are established in multiple sectors of industry. Currently more than ninety countries have adopted ISO-9000 as national standards. Purchased products and services from a company that is registered to the ISO-9000 standardization is assured that the quality of what is received will be as expected. There are, for example, many photographic equipment standards, including an ISO film speed code. Telephone and banking cards can be used worldwide due to the standardization of their use. International trade has been simplified by standardizing freight containers. The universal system of measurement facilitates the consistency of shopping and trade. Paper sizes are uniform. Symbols for automobile controls

are consistent, no matter where in the world the car was manufactured. Performance and safety requirement standardization ensures individual manufacturers the ability to design solutions to meet basic consumer needs while allowing for global sales and competition

(www.iso.ch/iso/en/aboutiso/introduction/achievements.html)^v .

Although ISO standards are internationally recognized, organizational applications differ within the series, dependent upon how the company chooses to be certified. The ISO-9000 series is primarily concerned with quality management, targeting features of a product or service required by the customer. Quality management applies to what the organization does to enhance customer satisfaction by meeting customer and applicable regulatory requirements and continually improving its performance in this regard. The series includes the following: ISO-9000 establishes a starting point for understanding the standards and defines the fundamentals of the ISO-9000 family; ISO-9001 applies to quality assurance in design and development, production, installation, and servicing; ISO-9002 includes quality assurance in production and installation; and ISO-9003 is a model for quality assurance in final inspection and test. ISO-9001 is the only standard that can be registered by an accredited independent third party; however, companies can be certified in the other standards. The ISO-9000 series specifies what requirements the quality system must meet but does not dictate how they should be met. The standards give a company the guidance and requirements for what constitutes an effective quality management system. ISO-14000 is a standard that is primarily concerned with environmental management. An organization strives to minimize harmful effects on the environment caused by its activities through this standard. All of the ISO standards are written in generic terms and are not specific to any particular products or services. The aforementioned standards are the most widely utilized; however, a multitude of additional ISO standards exist.

ISO-9001 has five main topics and twenty elements that need to be addressed during the attainment of certification and re-certification. The main topics are quality management system, management responsibility, resource management, product realization, and measurement, analysis & improvement. The twenty elements include: management review; quality system; contract review; design control; document control; purchasing; purchaser-supplied product; product identification and trace ability; process control; inspection and testing; calibration; inspection and test status; non-conforming product; corrective action; handling, storage, packaging, preserving and delivery; quality records; internal audits; training; servicing; and statistical techniques. Written policies are customized to ‘what’ a company does whereas the procedures target ‘who does what when’. Although each organization must meet the specified requirements of the quality system, how those requirements are obtained is not dictated by the standards.

Chapter III

PROCEDURES

An outside consultant was hired in 2000 to initiate and facilitate the process of obtaining certification in ISO standards. Although the consultant served as a facilitator and guided the company through writing the policies, much of the responsibility for writing the procedures was placed upon the individual departments as it related to its’ processes and product. The consultant provided needed resources and conducted meetings and follow-up to ensure that individual groups were correctly following ISO guidelines.

The sheet metal, fabrication, and piping departments had a system in place prior to initiation of the certification. Many of the procedures were routinely and consistently executed on a daily basis due to the job shop setting, the apprenticeship programs, and the need for cross-

training on multiple pieces of equipment to build ductwork, piping systems, and pressure vessels. The engineering departments, however, were less structured. Each individual engineer had a unique way of selling, estimating, and managing jobs. A variety of forms were utilized to accomplish the same task. Routine procedures were not consistently followed by the engineers, as there were multiple ways to accomplish the same end result.

Procedural documents, such as checklists and forms, needed to be devised to streamline the engineering departments. A flowchart was crucial to map the processes to be followed for tracking paperwork in all departments. Training was required to educate employees (i.e., engineering, drafting, accounting, site foremen) on utilization of the flowchart(s) and documents. Procedures needed to be developed to ensure that standardization was implemented and maintained. This would not only assist Bassett Mechanical in obtaining certification but also aid in the training process for new hires.

Employee Introduction to ISO-9001

Before creating any procedural documents or flowcharting process, employee education had take place. A review of literature was performed on the origins of ISO, what ISO represents, and how it applies to business. This information was relayed to the employees by the researcher. Education was performed via PowerPoint in the training room at Bassett Mechanical. The approximate forty attendees were primarily department managers and supervisors.

The researcher began by introducing the training session outline. The outline consisted of the following titles: Reasons for certification, Origins of ISO-900, ISO 9001:2000 standard, Process of obtaining certification, Organizing steering teams, and Writing procedures. Solicitation of group participation was initiated after the introduction. Reasons for certification were brainstormed by the group and written on an easel. Both pros and cons were listed. Some

examples of the pros included: to make us a better company, enhanced quality, meeting customer's needs and requirements, increased efficiency, team effort, increased market share, improved communications, and decreased rework and scrap rates. The group also came up with the following cons to obtaining certification: cost to acquire and maintain certification, potential for more paperwork, limited creativity in the future, and a change from the way Bassett is accustomed to conducting business. Overall, the participants thought of many more pros than cons. The downsides to certification were discussed and turned into pros.

Next, the origins of the ISO-9001 standard were introduced during the training session. A general review of the historical foundation was conducted, beginning with the military standard 9858, moving to the ISO technical committee that targeted quality management and quality assurance, and finishing with the ISO-9001 standard (1987, 1994 and 2001 versions). The basic content of the ISO-9001:2000 standard was also introduced. Discussion about the 2000 revision of the ISO-9001 standard ensued, specifically targeting customer satisfaction and continuous improvement. The five main topics and the twenty elements of the standard were reviewed. There were no questions or comments from the participants.

Next, the researcher carried out an overview of the process needed to obtain certification. This process included multiple steps. The discussion started with talking about the need to appoint a lead "ISO" person that would be responsible for overseeing the integrated system. This person would maintain all paper records and would report directly to the CEO and management review committee.

The need for and structure of work groups, specifically task forces and a steering committee, were discussed. It was explained that task forces would be responsible for revising procedures. Procedures were defined as 'who does what when.' The task force would consist of

a cross section of employees from various departments. The steering committee would comprise of managers that revise policies. Policies are ‘what we do.’ It was emphasized that ISO standards require a company to document what it does and how it does it. It is not the intent of the standard to change the way a company conducts business, but to simply document those ways. By doing this, it holds the company accountable for its actions, more specifically for what it does and how it does it.

A few suggestions were reviewed during the session to help make the certification process go more smoothly. One requirement of the standard was to address all of the “shalls” within each element, for example, “the supplier shall establish and maintain procedures to ensure that product that does not conform to specified requirements is prevented from unintended use or installation”. These “shalls” are investigated by the external auditors to determine if the company has met the standard’s requirements. The researcher suggested that all “shalls” be highlighted prior to writing of a policy or procedure to ensure that none were overlooked. The attendees were also instructed to utilize the ISO-9001:2000 numbering system as it differs from previous versions and is the most current way to number each policy and procedure.

Forms needed to be streamlined. Over the years, employees had devised and revised forms to suit individual departmental needs. One of the fundamental ways of improving quality is to obtain consistency. A dialogue occurred about the need to standardize forms. Participants expressed concern about forfeiting their existing forms. It was conferred that a task force would be best suited to review all existing forms and merge them into one format to fit all departmental needs.

Task forces would meet on an as needed basis, with more time dedication required in the initial stages of procedural development. A bulleted list of suggestions for procedural writing

was reviewed. The first suggestion pertained to flowcharting. A flow chart format was encouraged because it is a sensible way to report what is and should be done and allows for easier revisions. The task forces would be encouraged to identify a process, brainstorm all steps, put the steps in order, review these steps with others outside the group, and add any missing details. The following considerations were also presented for use during task force gatherings: discuss ground rules, goals and agendas; discuss the process and scope; evaluate any problems with the process; attend to missing steps; measure the process and/or process output; identify customers of the process and their needs; and add steps as needed. Participants on a task force would be encouraged to routinely review whether or not the requirements of ISO were met. Procedures should be kept general. Each person should ask oneself whether or not the procedure addresses everyone, if the result is correct, and if the procedures are clear and simple.

Once a task force accomplished its goals, the management review team would be responsible for reviewing, making suggestions for change, and approving written policies and procedures. The management review team would rely on the timing of the task forces to determine the regularity of meetings. The need for volunteers was discussed and if more individuals were needed, ones would be appointed at a later date. Interdepartmental representation was needed for each of the task forces and the management review team.

Implementation was the next topic of discussion during the training session. The attendees were reassured that adopting ISO standards would not change what the company was doing, it would just assure that the company was practicing what it stated it was doing. To ensure that practices were being followed, internal audits would be conducted on a routine basis. Individuals from various departments would be trained to conduct internal audits. These audits would occur prior to registration and routinely thereafter. An auditor would not be permitted to

audit ones own department for obvious reasons. Procedural revisions would be made by the task forces as based on the audits.

This idea of continuous improvement was emphasized. Ultimately, that is one of the areas that the accredited third party auditors will be concentrating on during the bi-annual visits. Some employees expressed concern about the presence of external auditors and satisfying requirements. The researcher told the audience that the company would likely pass if it followed and implemented the standard, worked as a team, and conducted adequate training so that everyone had a better understanding of the process.

The researcher concluded the training session by providing a few reasons for undergoing such an arduous feat. Bassett Mechanical will ultimately be a better company for obtaining certification. A few examples included improved quality, continuous improvement, and increased efficiency. Because the company's motto is 'We Answer to You', this is just one more way to add value to the products and services that the customer receives. It was also emphasized that the company may have the bragging rights of being the only mechanical contractor in the state of WI to have obtained certification. And lastly, everyone was encouraged to have fun.

A question and answer format was utilized upon completion of the PowerPoint presentation. Employee concerns arose regarding how implementation of the standard would affect routine procedures and business practices. The following were examples of questions from the audience: "Are we going to have to change the way we engineer a job?", "Will we have to retrain our apprentices and journeymen?", "Can we still weld the same way or do we have to do it a new way?", "How is this going to affect our customers?", and so on. The researcher provided feedback and answers to questions. Employees were assured that Bassett Mechanical would not change the way it does business but that certain procedures may be

altered. The implementation of ISO standards would be a matter of documenting what we do (policies) and how we do it (procedures). The only major change that could be foreseen was the standardization of forms, which was addressed earlier in the session.

Let the Games Begin

Once the researcher completed the introductory ISO-9001 training, it was time to initiate the next step. The management staff determined that outside help was needed since the company had never endured such an undertaking as obtaining certification. To help provide needed guidance, an outside consultant was hired through the local technical college. The consultant had hands-on experience from working at a manufacturing and service facility that underwent registration. That individual served as the appointed ISO person within the manufacturing company, which would facilitate carryover of experiences into Bassett Mechanical's obtainment of certification.

An initial meeting was scheduled for any employee interested in participating in the ISO process. A company-wide announcement about the date and time was made via e-mail. Approximately 45 people attended. All attendees were given a place card that displayed the individual's name, title and department. This was solely for the facilitator's benefit.

The first responsibility of the consultant was to assist in the formation of the steering committees. The steering committees were in charge of writing the policies. Department managers and vice presidents of divisions were delegated this responsibility. These individuals worked in small groups of two to four people, dependent upon the difficulty and complexity of the policy. Some participants were involved with more than one committee. Examples of how to write measurable goals were provided and the participants were reminded to address all the "shalls" of the standard.

Task force formation was the next step. Each task force consisted of a cross section of employees from various departments that would be responsible for revising existing or creating new procedures. New procedures would be created only if one did not exist. The employees were given the opportunity to volunteer their time and expertise to a task force. Each task force wrote the procedures, which were defined as ‘who does what when.’ Just as with the policies, the procedures also had to be written as measurable goals and had to meet the “shalls” of the standard. Duties were explained and assignments distributed to the supervisors and line staff. Since more people were needed, the researcher was responsible for solicitation. Those individuals on each task force were selected based upon expertise, experience, skill level and departmental involvement in the procedure. The researcher approached each needed individual and asked for the person’s help. Time obligations were explained and the benefits of obtaining certification were introduced. All of the individuals that were invited to participate agreed to help.

Once the committees and task forces were formed and duties distributed, meetings were encouraged to transpire a minimum of once per week during the initial stages of policy and procedural development. Meetings were scheduled with the facilitator on an as-needed basis. Much of the responsibility for writing the procedures was placed upon individual departments as it related to its’ primary product and/or service. However, the groups were instructed to write the procedures in universal terms so as to address every department. Questions arose and guidance was needed for writing the procedures. The task forces found it difficult to write a procedure in general terms but at the same time have it apply to each department. The facilitator provided needed resources (written examples, experience, and visual demonstrations) and conducted

meetings and follow-up to ensure that individual groups were correctly following ISO guidelines. Guidance was provided via phone conversations, e-mails, or during group meetings.

Since the sheet metal, fabrication, and piping departments had a systematic approach already in place as to how things were done; the largest amount of time for that department was directed at measurement, analysis and improvement. As mentioned earlier, many procedures were routinely and consistently executed on a daily basis due to the job shop setting, the apprenticeship programs, and the need for cross-training on multiple pieces of equipment to build ductwork, piping systems, and pressure vessels. Much time was dedicated to writing procedures that related to monitoring and measuring processes and products. Control of nonconforming products was also a significant focus for this task force as was preservation of product.

The engineering departments, however, were less structured. Each individual engineer had a unique way of selling, estimating, and managing jobs. Routine procedures were not consistently followed by the engineers, as there were multiple ways to complete a task. The task forces responsible for procedures pertaining to engineering had a difficult assignment to embark upon, particularly as it related to product realization. Multiple internal meetings were needed to address all of the “shalls” in this area. This task force consisted of the researcher and one engineer from each department, including heating, ventilation and air conditioning (HVAC), refrigeration, industrial ventilation, service, and sheet metal. Flowcharting was utilized as a tool to illustrate the steps an engineer needed to follow from initiation to completion of a job (see Exhibit II). The task force started with the basic steps needed to initiate a job (i.e., load calculations, design/build drawings, specifications, assignment of a job number) and progressed to the final stages of a job (i.e., start-up, final punch list review, operations and maintenance

manuals, warranty letter). A multitude of hours were invested in creating and editing the flowcharts. This task force distributed drafts of the flowchart to other personnel, such as departmental and project managers, as well as customers, in search of feedback. Internal and external customers readily provided suggestions and feedback. Revisions were implemented as based on input and final drafts were given to the appointed executive secretary for final formatting.

Not only did procedures need revision but existing forms had to be streamlined. As mentioned earlier, each department within the organization had either developed new forms over the years or revised existing forms tailored to meet individual needs. A task force was instituted to collect and review every form used within the company. This was no small feat since numerous employees possessed desktop and laptop computers that contained the forms that the individual used on a regular basis. Some forms were also in file drawers and others were printed and bound in notepads. Once all forms had been collected, the task force met to find commonality amongst the forms and grouped them accordingly. The task force dealt with one set of forms at a time. Rough drafts of newly created and merged forms were sent via e-mail to employees that had previously utilized the original forms. The task force was able to streamline company forms from the original one hundred down to twenty-five.

Once feedback was obtained and consensus was acquired for the policies, procedures and forms within individual groups, final approval was needed from the management review committee. This committee consisted of many of the management and personnel already involved in the ISO process. Hard copies of the revised materials were requested and distributed by the ISO appointee and given to the committee for review prior to the meetings. With the exception of a few procedures, final approval was given for the majority of the policies,

procedures, and forms. Those few exceptions went back to the task forces for further revisions and were eventually approved by the committee.

Once approval was received from the management review committee, final versions of the policies, procedures, and forms had to be formatted. The executive secretary was responsible for ensuring that these ISO documents were laid out appropriately and obtainable to any individual in the company. The intranet was set-up so that any internal employee with access to a computer could easily retrieve needed information. As much as an undertaking as was writing what the company does and how it does it, it paled in comparison to the next step of implementation.

Implementation

Implementation of ISO standards required some changes throughout the organization. Routine practices were slightly altered and more systematic processes were put into action. Coaching and support were needed from upper management and the researcher. The consultant was no longer involved at this point. He had provided suggestions and direction throughout the writing phase and would be contacted should the need arise.

The management review team had one final meeting with the consultant, prior to his departure, to obtain any suggestions for implementation. Input from the consultant included: routinely check progress, continually educate, gain commitment, set improvement goals and celebrate success. The consultant also suggested two different ways to launch the quality system. One way was to unleash it in a phased manner and the other was to dive head first with all sections at once. As based on customer demands and the CEO's direction, it was decided to commence by implementing all sections simultaneously.

Uncontrolled copies of the standard were distributed to all members of the management review committee. Uncontrolled meant that the copy was used for reference only and it was the individual's responsibility to verify any recent changes via the intranet. The only people that had controlled copies were the ISO appointee, the human resource manager, and the CEO. These individuals were given the authority to make changes to the policies and procedures as deemed appropriate. Controlled copies were those that had the most up-to-date information. Company personnel would be informed of any changes to the policies or procedures via e-mail.

Individuals from the committee were given the task of initiating implementation of the standard. Because all departments within the organization were represented on the committee, it was logical to have those individuals lead the effort. In order to facilitate a smooth introduction of the standard to the entire company, the management review committee was regrouped for training. The ISO appointee and Human Resource Director conducted the training. Hard copies of the policies and procedures were distributed and reviewed as a group. Suggestions for training the trainer were discussed and leading by example was encouraged. Open door policy was promoted and praise and reward were emphasized. Management needed to lead by example before others could be expected to participate.

Of all the changes created by recording what we do and how we do it, the most in-depth and significant change involved the engineering departments. The way that the engineers were accustomed to designing and running jobs was altered. The number of steps in the process of taking a job from conception to completion had greatly increased for some engineers, dependent upon an individual's practices and routines.

To aide in alleviating the stress and inconvenience of referring to the intranet for details of the standard, the researcher devised a checklist. It consisted of an overview for specific types

of jobs, for example, design/build projects with greater than twenty-five hours of design time. It also gave direction as to when a job number was required versus a work order number. The checklist ensured that each job folder consisted of the appropriate paperwork as per the ISO standard. Suggestions were also listed and reminders were noted to assist in the learning process.

The researcher conducted a training session to facilitate the implementation of the new engineering procedures checklist. Overhead slides were utilized as a medium and the checklist was reviewed item by item. The audience raised questions that required the assigned task force to reevaluate steps within the ISO procedures and address needed changes. For example, engineering drawings needed to be reviewed on two separate occasions if drafting for the job exceeded twenty-five hours. The written policy was unclear as to what would be evaluated on the drawings. Minor changes were made to the checklist as well and the final draft was posted on the intranet.

Once the checklist was finalized, committee training was complete and the company-wide policies and procedures were implemented, the next step was to conduct an internal audit. Employees needed to be trained to serve as qualified auditors. Auditors were chosen as based on one or more of the following: education, training, and/or experience. A task force was created to determine which personnel would serve as auditors. This task force would also oversee the audits and provide information to the management review committee.

Personnel from various departments and positions were chosen to become auditors. Once the auditors were chosen, audit etiquette was reviewed. Auditors were to collect and analyze evidence in an objective manner where no personal bias was allowed. Finding facts, not faults, was emphasized. Acting in an ethical manner was discussed. If an observation or problem was

noted, the auditor was to be open and honest. Employees would be required to conduct an audit independent of his/her department.

A brief overview of interpersonal skills was also initiated with the auditors. The auditor was to introduce one self and state the purpose of the audit. Once a question was asked, listening and note taking were essential. Business-related terminology was encouraged, not ISO lingo. Open-ended questions would solicit more information than a close-ended question. Mutual respect needed to be shown during the audit. The auditor was encouraged to thank the person for the information and the cooperation.

Evidence collection was discussed. Each individual was to follow a checklist. The checklist was devised specific to each procedure and was created by the auditors prior to the actual audit. Documents and records needed to be reviewed and actions may be observed, dependent upon which area of the company was being evaluated. People would be interviewed and comments recorded. Records had to be made about discussions, people spoken with, part(s) numbers, and the like. Samples collected from a department may have included a request for an index, list, file drawer or parts bin. Selection may also have come from a stage, product group or type, or department. Random samples were needed to determine if the entire system was compliant.

The audits were approached in a systematic way. Four phases of an internal audit included planning, performing, reporting and follow-up. The first step, planning, consisted of scheduling, reviewing standards, reviewing documents, writing checklists, and providing prior notice to those departments being audited. Next, performing was initiated with an opening meeting of the auditors, review of evidence, completion of checklists, and a closing meeting. Thirdly, reporting consisted of collection of written reports and corrective action forms. Lastly,

follow-up consisted of corrective action, verification of completion and effectiveness, closing meeting and reporting to the management review team.

Once an audit was complete, the auditor reported all findings and concerns via an audit report. This report included the report date, interviewee, purpose and scope, findings and concerns, responsible manager, and the lead auditor's signature. Corrective action forms were attached for each finding. Response dates were listed to ensure that the responsible manager reacted to the corrective action form in a timely manner. Follow-up audits were conducted to ensure that corrective actions were implemented and effective. The original auditor would be assigned the task of verifying that the corrective action steps were taken. All internal audits were reviewed with the task force and presented at the management review committee meetings.

Following the internal audits, the researcher sought input from the internal auditors regarding feelings and concerns. Many of the auditors reported that the initial reviews were clumsy and somewhat uncomfortable. Clumsiness was stated because of the unfamiliarity with the ISO process and initial lack of knowledge about what other departments do on a daily basis. The comfort level was initially decreased because peers were evaluating peers. The auditors felt that it was difficult to be critical of those individuals that had worked for the company for many years. No major concerns were noted.

The initial internal audit found approximately twenty different items that needed to be addressed by either the task forces or the department/individual. Task force changes pertained to re-writing procedures. Departmental or individual changes pertained to better implementation and enforcement of the procedures. Internal audits would be conducted at least bi-annually to ensure that policies and procedures continued to be followed and to facilitate continuous improvement.

Chapter IV

FINDINGS

As soon as the internal audits were complete and corrective actions were executed, the last step in achieving certification was the external audit. Bassett Mechanical needed to hire an accredited third party firm to conduct the audit. Inquiries were made to a number of Fox Valley businesses to determine which of the auditing firms came with high regard. The consultant was also asked for his recommendation. The proposals were presented to the management review committee and an auditing firm was hired.

The ISO appointee contacted the firm to establish dates and requirements. Once established, this information was relayed to the employees. Three business days were needed for the auditors to do a thorough analysis of Bassett Mechanical's policies and procedures. Employees were concerned that the company would not pass the audit and this created uneasiness throughout the organization. The most commonly cited concern pertained to being personally interviewed by an auditor. Individuals were afraid that one would not have all the answers to questions or would not know where to refer the auditor if certain information was requested.

A question and answer session was held one week prior to the external audit to help alleviate employee concerns. All employees were invited to participate. Sample questions and potential answers were reviewed. In addition, the "We answer to you" philosophy was printed in the bi-monthly newsletter to remind employees about the company's reputation and promise. As based on employee comments, these strategies appeared to decrease weariness with regard to the impending audit.

The first day of the audit was kicked-off with an opening meeting. The management review committee met with the two auditors. Introductions and backgrounds were shared. The two auditors asked various questions to ensure that the committee was knowledgeable about the written policies and procedures. A schedule of events was presented and the audit process was reviewed. Each member of the committee was assigned to accompany the auditors throughout the audit. Appointees were chosen based upon expertise and involvement with the particular area being evaluated.

Once the opening meeting ended, a desk review was initiated. Prior to the site visit, the auditors had conducted a review of the written policies and procedures. The ISO appointee and the Human Resource (HR) Manager received feedback about the desk review, answered questions and retrieved requested forms and records. No departments were visited and no individuals were interviewed during the first day.

The auditors found a variety of areas in the policies and procedures that needed improvement. Some changes were undertaken immediately and others required more in-depth attention. The immediate changes primarily involved modifications in wording, such as details or clarifications. The task forces addressed the in-depth changes at a later date. As based on these findings, the ISO appointee and HR Manager expressed concerns about the company's ability to obtain certification. A meeting was requested with the auditors at the end of the first day. During the meeting the auditors assured the staff that it was not unusual to find multiple areas for improvement during an initial audit. Bassett Mechanical was told that it would likely pass the audit and obtain certification and registration. This was based on the fact that the company appeared to take the process seriously and had invested much time and effort into documenting what the company does and how it does it.

The second day of the audit was more hands-on. The auditors visited various departments and asked employees a multitude of questions. The goal was to ensure that procedures were followed as written in the standard. The employees were expected to either have an answer or provide resources to obtain the answer, whether it was in verbal or written form. Job folders were randomly chosen for evaluation from the engineering departments. Shipping and receiving was evaluated before product(s) left the facility. The auditors jointly conducted a shop tour to evaluate tagging and labeling procedures as well as product quality. Multiple other activities were also observed and audited.

The first half of the last day involved evaluations of any departments or procedures that were not addressed on the second day. A closing meeting was held during the second half of the day. The purpose of the meeting was to report any areas of concern and to give the company a passing or failing grade.

Seven audit findings were discovered and shared with the management review committee. The seven audit findings that required corrective actions included the following elements: document control, servicing, contract review, process control (two findings), and calibration. Within document control, some forms within the company and quality system were not properly controlled. The auditors found uncontrolled documents that should have been controlled. The standard required that all forms have a 'controlled' or 'uncontrolled' marking. The area of servicing involved the company's inability to retrieve records of scheduled routine maintenance. Routine maintenance referred to truck fleet maintenance, building maintenance, and machinery maintenance. Bassett Mechanical was conducting the maintenance but failed to properly record the schedule and results. Contract review was shortcut. Job numbers were issued prior to formal contract review. The standard required the employee to consider the

customer's request with regard to the company's ability to meet the scope and requirements. Shipping and receiving received the one of the corrective actions in process control. All equipment and materials that entered or exited the building were to be tagged for location, job number, etc. A small pressure vessel was found on the shop floor without a tag. The second process control finding concerned a lack of final inspection. Outgoing shipments required final inspections prior to leaving the building. The auditor could not find a final signature by quality control manager. The calibration finding was similar to the servicing finding. Calibration was being routinely conducted but inadequate records were kept. The last finding pertained to the quality system. Better definition of the processes and better documentation to support the definitions was needed. This was evident in the desk review.

Explanations had to be provided to the auditors as to how the company planned to improve on the findings within ninety days. The company then had six months in which to implement the improvements. There were a number of other areas which were not severe enough to require corrective actions but that needed to be improved. In the end, the auditors registered the company as meeting all of the requirements of the ISO standard. Bassett Mechanical could now proudly say that it was an ISO compliant company.

Interpretation

Having possession of the certificate will ultimately make Bassett Mechanical a better company by raising the levels of quality, safety, reliability, and efficiency of both its products and services. Time will tell if the company accomplished these goals; however, it is the opinion of the researcher that, between the implementation of the standard and obtainment of certification, Bassett Mechanical will be a better company overall. These goals will be measured in the future through a variety of means: decreased scrap rates, fewer customer complaints,

estimated job costs versus actual job costs, improved efficiencies on the job, increased quality through inspections (decreased re-work of product), and so on. It was the ultimate goal of Bassett Mechanical's to ensure continued business relations with existing customers. It appears that obtainment of certification streamlined how business was conducted and the company continues to conduct business with those customers that required certification.

Chapter V

SUMMARY

A multitude of changes were made during the ISO process to the way that Bassett Mechanical had been conducting business over the past sixty-six years. Historical and procedural information was communicated to department managers and supervisors through group training and open discussion. Increased awareness of individual responsibilities and how the ISO process affected existing policies and procedures was accomplished. Procedural documents, such as checklists and forms, were revised. The flowchart method was crucial to mapping the processes to be followed for tracking paperwork. Training was required to educate employees (i.e., engineering, drafting, accounting, site foremen) on utilization of documents and flowcharts.

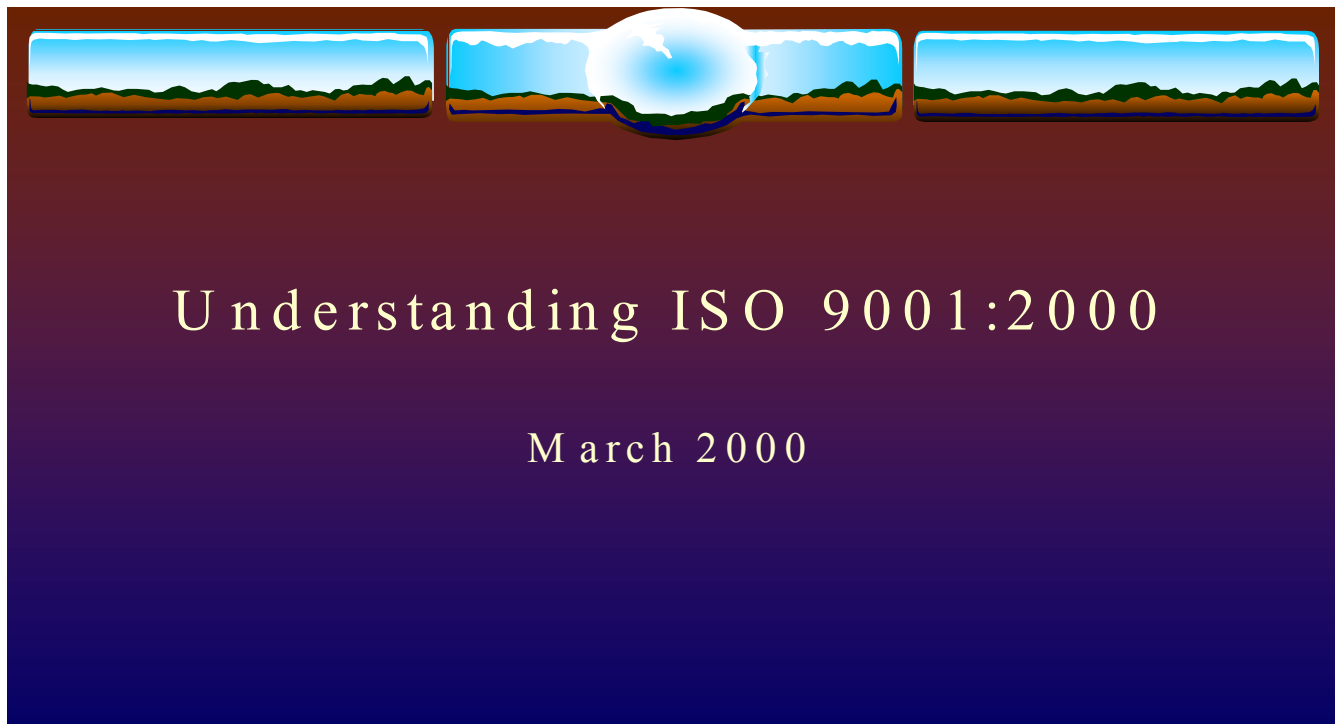
The steering committees addressed policy changes during the written stage and implementation phase of certification. Procedures were developed by the task forces to ensure that standardization was written, implemented and maintained. The management review committee oversaw the entire process to make certain that all steps were followed and implementation ran smoothly. The internal auditors were responsible for evaluating the performance and effectiveness of the policies and procedures.

Personnel from all departments participated in some fashion with the success of obtaining certification and registration of the ISO standard. No one individual was to be commended but the company as a whole should be rewarded in knowing that it is, to the best of its knowledge, the only mechanical contractor in the state of Wisconsin, to demonstrate the fortitude and desire to be the best it can be. Continuous improvement is a requirement of the ISO-9000:2000 standard and has fundamentally become an inherent part of the Bassett Mechanical philosophy and culture.

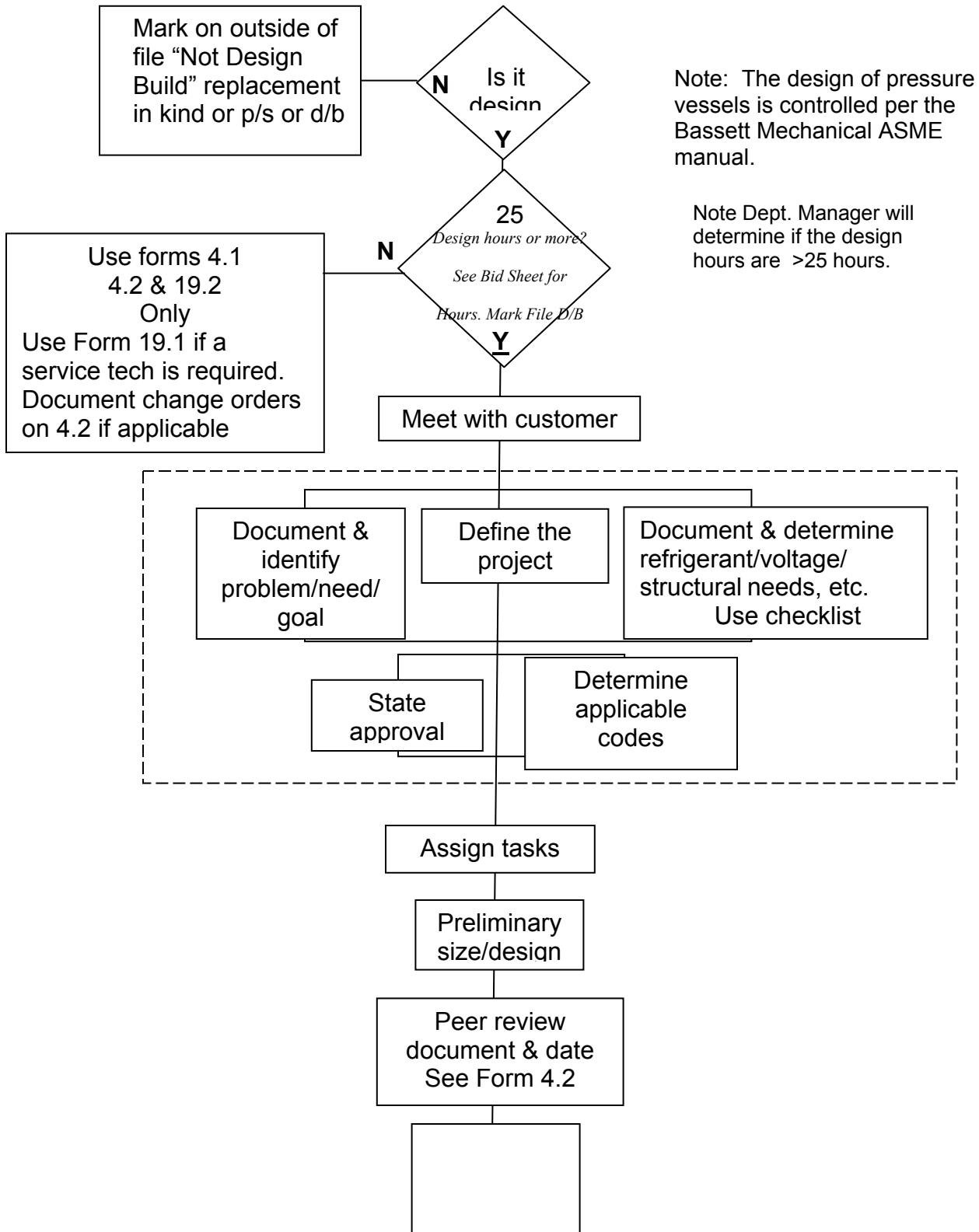
APPENDIX A

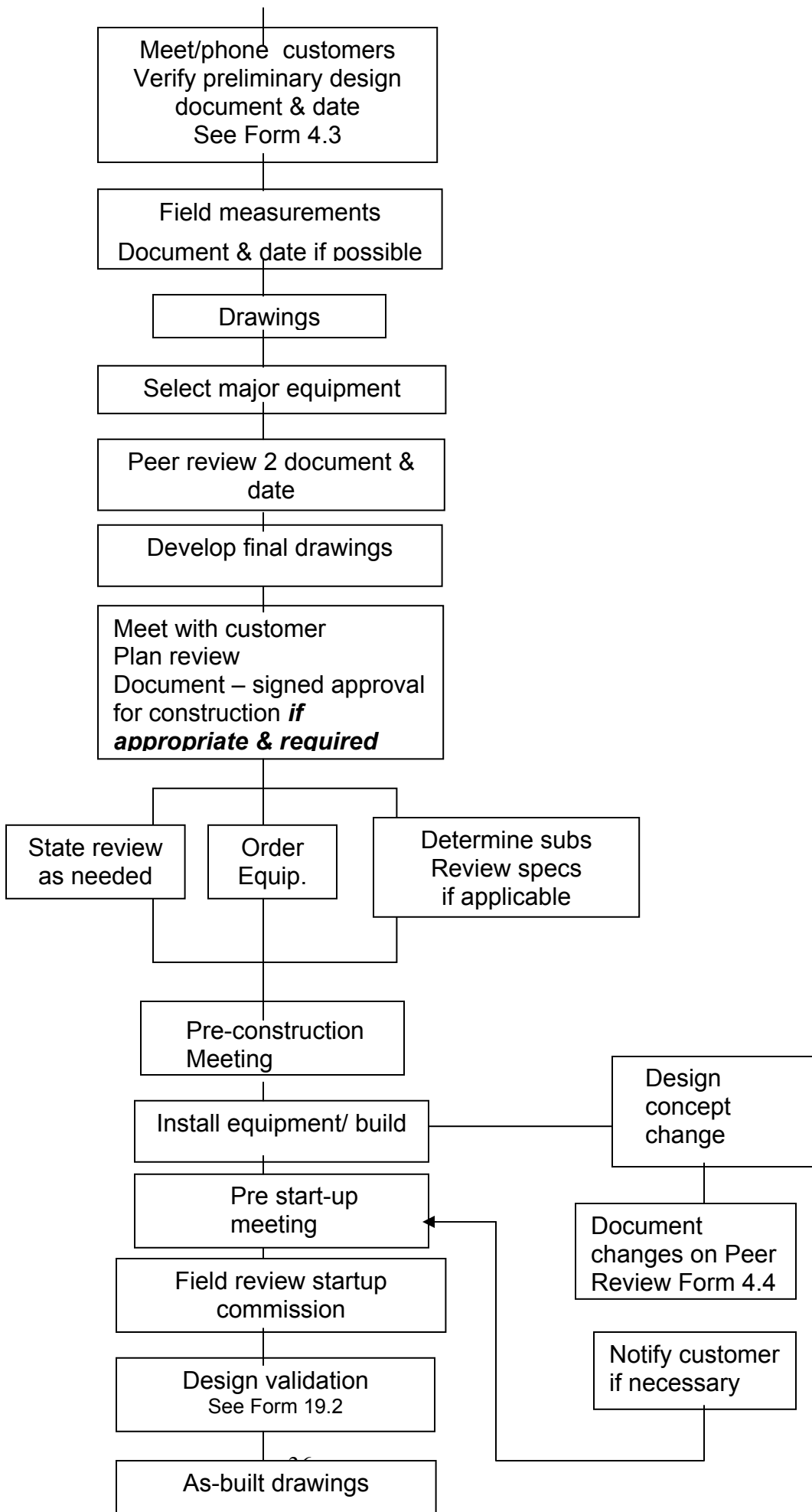
POWER POINT PRESENTATION OF ISO 9001:2000 TRAINING

Instructions: To view Power Point presentation, double click on the colored slide below. Use the enter key to scroll through the slide show. Hit escape when finished viewing show.



APPENDIX B – DESIGN CONTROL FLOW CHART





APPENDIX C

‘NEW JOB’ CHECKLIST

JOB FOLDER

NON-DESIGN related JOB FOLDERS should include:

- Contract Control Sheet
- Bid Summary
- Form 19.1 (Pre Start-up Meeting) – required if service dept. is involved
- Form 19.2 (Final Inspection Checklist) – job completion
- Warranty letter (needed if doing equipment installation)

DESIGN/BUILD JOB FOLDERS WITH <25 HRS. should include:

- Contract Control Sheet
- Bid Summary
- Form 19.1 (Pre Start-up Meeting) – required if service dept. is involved
- Form 4.1 (Project Definition)
- Form 4.2 (Peer Review #1)
- Form 19.2 (Final Inspection Checklist) - job completion
- Warranty letter

DESIGN/BUILD JOB FOLDERS WITH >25 HRS. should include:

- Contract Control Sheet
- Bid Summary
- Form 19.1 (Pre Start-up Meeting) – required if service dept. is involved
- Form 4.1 (Project Definition)
- Form 4.2 (Peer Review #1)
- Form 4.3 (Customer Meeting) - pre-construction
- Form 4.4 (Peer Review #2)
- Form 19.2 (Final Inspection Checklist) – job completion
- Warranty letter

FOR JOBS - ACCOUNTING SHOULD RECEIVE

- Contract Control Sheet (CCS)
- Bid Summary
- Rate sheet for all T&M and Not To Exceed or rate multiplier
- Customer Signed Purchase Order or Signed Contract or Signed Quote
(If verbal p.o., please provide CCS or T&M rate sheet)

****Not to Exceed job – need T&M rate sheet. Also, project manager to communicate nature of the contract to accounting****

****T&M job = need bid summary sheet or rate sheet****

FOR WORK ORDERS – ACCOUNTING SHOULD RECEIVE:

Signed Purchase Order

OR

Contract Control Sheet

If applicable: rate sheet for all T&M and Not to Exceed or rate multiplier
(If verbal p.o., please provide CCS or T&M rate sheet)

****Contract Control Sheet needed if another trade is involved****

****Not to Exceed job – need T&M rate sheet. Also, project manager to communicate nature of the contract to accounting****

****T&M job = need bid summary sheet or rate sheet****

****Service calls need detailed service reports [exact location, p.o. # or verbal p.o. per (person's name)]**

Mark folder tab with “Design/Build” or “Direct Replacement” or “Plan & Spec.”, etc...
Suggestion: Create a separate ISO folder within the job file

References

ⁱ Author Unknown. “Frequently Asked Questions About ISO 9000.” <http://ISOeasy.org> (July 27, 2002).

ⁱⁱ Jarvis, Chris. “ISO 9000 History.” Business Open Learning Archive
<http://sol.brunl.ac.uk/bola/quality/history.html> (no date available).

ⁱⁱⁱ Author Unknown. “Where ISO came from and Who is behind it.” <http://www.iso.ch/iso/en/iso9000-14000/tour/wherfrom.html>? (January 1, 2002).

^{iv} Author Unknown. “ISO in the 21st Century.”
<http://www.iso.org/iso/en/aboutiso/strategies/strategies.html> (January 1, 2002).

^v Author Unknow. “ISO’s achievements.”
www.iso.ch/iso/en/aboutiso/introduction/achievements.html? (January 1, 2002).