Ed Sellack sat in his favorite chair in the study late Sunday afternoon thinking about the actions he would have to put into motion tomorrow to respond to what his boss told him on Friday.

In spite of spending most of the weekend mulling over the various possibilities, he was still not sure of the best course of action to take, much less how to implement it. However, John Bass, his department manager, had made it clear that he would have to do something.

Ed is Department Manager for Custom Products Design for Berkeley Boilers, Inc. (BBI). Founded in 1897, BBI is one of the country's oldest and largest manufacturers of boilers and associated fuel burning and control systems. BBI is well-known for the quality and reliability of its products which are used primarily in commercial and industrial applications.

In addition to making several lines of standard products, BBI specializes in custom designed systems. In recent years, custom systems have accounted for an increasing share of the firm's business. Custom systems have grown from 25% of the total business just five years ago to a little more than 40% today. All indications point to a continuation of this trend since boiler installations and applications are becoming increasingly complex.

Both standard and custom systems are products of the firm's talented Engineering Design Department. The department members are divided into five departments: Research and Development (13 employees), standard products (52), custom products (37), fuel technology (12), and safety verification (6). Each department is headed by a department manager who reports to John Bass, Vice-president for Engineering Design.

The Research and Development (R&D) department performs applied research and keeps up with technological advancements made by competitors and others in the field with the exception of fuel technology issues that are researched by the Fuel Technology department, which is also responsible for the design of the fuel burning systems in all BBI boilers.

The Standard Products design department is responsible for designing the firm's seven basic models.

The Custom Design department designs special applications and very large systems (e.g., hospitals, college dorms, major office building, etc.).

The Safety Verification department works with all others to ensure compliance with industry safety standards as well as special standards required by local codes at the installation site.

After several years of double-digit sales growth, sales have grown at a rate of only 5-6% for the last two years. However, profits declined by 15% in the previous year and 27% last year. In examining the profit decline, management has identified the high cost of designing and manufacturing custom products as the chief source of the decline.

The Custom Design department takes great pride in its innovative ability and being able to respond to any customer's requirements. Members of the department are BBI's most experienced designers and engineers. Experience ranges from two to 44 years with and average of 23 years.

The department is organized into three groups each consisting of a supervisor, two engineers, six designer/draftsmen, and a checker (who checks drawings for accuracy and fulfillment of requirements). Each of the three supervisors reports to Ed Sellack. Ed started with the company in 1951 as a draftsman and has worked his way up to department head.

The department uses traditional design and drafting methods that have changed little in 20 years. Each supervisor and the two engineers in his department are responsible for the design of the overall system and its associated specifications.

The designer/draftsmen work from the overall plans to develop the detailed plans required to manufacture a system. At any given time each department may have three to five projects under design and review.

The management analysis Ed has been reading pinpoints a number of specific problem areas in the department. The data show a clear trend in the number of delinquent (1-4 days late) and chronically delinquent (5 or more days late) drawings used to support manufacturing operations.

A second problem is the high number of changes mandated by the Safety Verification department after its review of the drawings.

A third problem is the high number of errors found by the checkers before drawings are approved for submission to safety verification or to manufacturing. For most errors at this stage, a drawing must be completely redrawn and resubmitted to a checker.

Finally, the engineers and designers are cited for using too many non-standard components when standard components are available. Using standard components when possible saves money since no design time is required and manufacturing costs are lower because of the volume runs possible with standard components.

John Bass, Vice-president for Engineering Design, has made it clear to Ed that things have to change quickly. John usually lets Ed make decisions about how to manage the department but this time he made specific suggestions about how to deal with the situation. He suggested that Ed institute computer-aided-design (CAD) methods such as those used in the Standard Products department, that the staff be increased by three engineers and six designer/draftsmen since the workload has increased so much recently and is expected to continue unabated.

He further suggested that four or five of the people come from the Standard Products department (which has seen a decline in work with the growth of custom products and where they have had CAD experience) and that the remaining needed workers be hired from outside the company.

Ed recognizes the need for more people but is very uncomfortable with the idea of going to CAD and bringing in people from the Standard Products department. Only three of his people have experience on CAD systems, and even that was obtained several years ago while they were still in school; none has any actual production experience.

Many members of his department are familiar with CAD, either from school or friends in Standard Products, and are anxious for the introduction of CAD into the Custom Products department. Other members (about 40%) are fearful of what the introduction of CAD will mean to the department and their work.

Some of the fearful members transferred into Custom Products when CAD was introduced there three years ago because they did not want to make the changeover. Ed is also concerned with the amount of production time that will be lost during a switchover to CAD. He wonders "since the department is already behind, won't the introduction of new methods just create more problems and further delays?"

Ed's three supervisors are all excellent performers who are highly competent in their respective areas of responsibility.

Joe Douglas has been with BBI for 18 years. He is a graduate of the University of Kentucky with B.S. and M.S. degrees in Mechanical Engineering. He has been a supervisor for six years.

Mike Christian has been with BBI for 26 years; the last 14 as supervisor. He took two years of engineering courses at the local university before joining BBI as a Junior Engineer.

Paul Lawrence has been a supervisor for two of his six years with BBi. He worked for BBI's primary competitor for five years before joining BBI. He has B.S. and M.S. degrees from the Ohio State University and an M.B.A. from the University of Pittsburgh. Paul is seen as an "up and comer" in the company and is seen by Ed (as well as many others) as Ed's successor. He is likely to be very enthusiastic about moving to CAD since he has been pushing Ed in this in this direction even before becoming a supervisor.

Ed knows that Joe and Mike think pretty much the same way he does on CAD. They know very little about it but don't think it would be very effective in Custom Products design because of the custom nature of the design work. In their opinion, Custom Products requires much more design effort and individual input to develop design concepts than Standard Products.

Although Ed realizes that a CAD system may solve the "speed" problem, he doubts whether it will solve some of the other problems. While it may be hard to get the department changed over, he knows that it will be tougher to go against what the boss has suggested. John Bass doesn't offer suggestions only to be ignored. Suggestions are his polite way to tell his subordinates what he wants. With pressure to get the work out, Ed's got to find a way to meet John's objectives without being too disruptive to productivity and quality in the department.