Case Study Reviews

Reviews of engineering cases are regularly published to provide readers with examples of case material as it is developed. A list of available cases may be obtained from the Engineering Case Program, Room 500, Stanford University, Stanford, California 94305.

Critical Reviews

ECL 172—"This Must Be Done!" *by Professor Geza Kardos, Carleton University.*

This is a short case, in two parts, which describes historically the rather dramatic beginning of the jet aircraft engine. The jet engine is a basic invention of Frank Whittle, who combined the gas turbine, the axial flow compressor, and a jet exhaust into a patented engine for high altitude aircraft propulsion. He patented his ideas in 1930, and followed it with many patented refinements, but he could not sell or give them away. Quite unexpectedly in 1935, the potential of his inventions was realized, and the necessary financial backing for development was received. Three years later the first Whittle jet engine was tested. From 1941 to the present is history that everyone knows.

This is an interesting, well written case study. It is historical, and it is best suited for reference reading in a course in engineering history. Some of Whittle's original sketches are included in part A.

In part B, the independent evaluation of the Whittle jet engine by Bramson is of more than passing historical interest. In 1935, before Whittle received the financing he so desperately needed, the backers requested an independent evaluation, and M. L. Bramson received the charge. This is more than just the constructive evaluation by a consulting engineer, which was requested. Mr. Bramson immediately grasped the import of Whittle's invention and conceived the total concept of a streamlined jet aircraft, all at a time when biplanes ruled the air lanes. His thermodynamic calculations in support of his recommendation to finance development can be used as an exercise for students in beginning thermodynamics.

Reviewed by Professor Robert F. Steidel, Jr., University of California—Berkeley.

ECL 156—Dalmo Victor: Positioning a Microwave Diode, *by Sue Hays, Stanford University.*

Too much of engineering education is analysis, whereas in most employment, synthesis is required. This case provides a suitable vehicle for teaching synthesis in a mechanical engineering design course.

The case provides a motive: a microwave diode must switch antennas to progressively narrower beam widths as a spacecraft recedes from the earth. The case provides a problem: the ceramic switching diode cannot be rigidly mounted, since thermal expansion due to the 140 degree temperature range would crack the ceramic. At this point the problem could be put to the class: how would they mount the diode? Student solutions then can be compared with the actual solutions, which utilized a spring washer to provide force, despite dimensional changes. At this point difficulties with the actual solution and possible fixes can be discussed.

This case shows how a mechanical engineer must consider inputs from other engineering disciplines. Electrical eddy current losses in the spring washer material must be kept to a minimum. The electrical isolation obtained from a teflon shield must not be compromised by drill burrs or chips. Another problem was caused by cold-flow of nylon pins. The student can gain experience in experimental design by suggesting the test protocol to determine cold-flow. Finally the student can suggest an assembly procedure to ensure that the diodes will be positioned with the proper spring force to ensure their reliable operation.

Thus in use of this case just enough information can be provided to the student to let him attempt 1) mechanical design, 2) experimental design, and 3) assembly procedure. Then he can get feedback from the actual case to see how realistic his solutions were.

Reviewed by Professor John G. Webster, University of Wisconsin.

ECL 180—Ascendent Electric Company, *by David P. Rutenberg.*

In the case study of the Ascendent Electric Company, the author selected certain areas as a basis for case projects. Projects of this nature such as engineering work load analysis, engineering time allocation, application of queuing theory to manufacturing and assembly production runs, and problem solving by optimization of known factors require the minimum of data in order to develop suitable training exercises.

There remain, interspersed within the text of the material, numerous possibilities for rather intensive study in other areas of engineering and management had more data been provided.

In the management area, projects could question the adequacy of the Ascendent Company's system of organization by product group which, in reality, seem to be a system based more on the type of customer than of the product itself. This exercise could be expanded to include the areas of responsibility of the product managers and their immediate supervisors, the numerous vice presidents.

The adequacy of the organization of the sales department, which also seems to be subdivided by customer type, could also be investigated in conjunction with the compensation program for sales personnel. Special emphasis could be applied to the incentive (bonus) program.

In addition, the requirement that the sales engineer not only sell his customer but sell other company departments in order to win their cooperation in providing engineering services could be examined.

A major course project could be an inquiry into the soundness of having a separate division—divorced from the sales department—determining which sales projects would be worked on and the emphasis given to each project.

Other prime course projects more suitable for technical study and scrutiny would be the soundness of the decision to accept orders for motors and controls without proper engineering evaluation as to their end use, especially when new type products were to be supplied; and the supplying of equipment without proper or sufficient protection to preclude failure due to external causes.

Taken as a single entity, this case would be difficult to utilize for classroom study because of the chronological time period it covers and the absence of pertinent data which would allow a complete understanding of the company's organizational structure.

When broken down, it provides an almost never ending source of interesting and challenging material of use by the educator.

Reviewed by Professor Howard L. Underberger, University of Florida.