CASE STUDY #13

The Barnes Group Case Study

The Barnes Group is a Fortune 500 company, that manufactures and distributes precision metal parts and industrial supplies. Its three divisions are Barnes Aerospace, Associated Spring, and Barnes Distribution.

Development II was retained to assist Barnes Aerospace expand beyond their charter as a worldwide producer of machined and fabricated components for the aircraft engine and airframe industries. Additionally they provide engine component overhaul and repair services for many of the world's major commercial airlines.

Development II conducted the project using our proprietary New Product Development Methodology.

Step 1: "Painstorm" Ask potential customers (3-6 people) to identify what they do not like or what bothers them about their present Products

Using one-on-one interviews and focus groups with airline specialists, Development traveled around North America and Europe inquiring of these experts what problems they encountered in their day-to-day operations. A list of issues, complaints and problems was compiled and categorized according to industry and/or problem type. This raw material was presented to the internal Barnes Aerospace management team, comprised of Senior Management, R&D, Manufacturing, and shop foremen. Lead by Development II, this team evaluated each problem category and made the determination which area they were best qualified to pursue.

Step 2: Conduct a Survey of Potential Customers. Quantify Irritation Level. Survey customers using ConSensor®. Ask them to rate their satisfaction with the issues or problems that were identified in the Painstorming Session.

Not surprisingly, the Barnes Aerospace internal team chose to look further into the area of aircraft engine overhaul. The results of the "Painstorming" material addressing this particular area were synthesized by Development II into a questionnaire that was distributed to a wider array of experts in the aerospace industry. The highest priority problems revolved around the manufacture and assembly of jet engines.

Step 3: Analyze the Results of the Survey. Derive Customer Priorities.
Using state of the art techniques, such as QuantaMetrics® (Neural Networks), derive the "hidden persuaders" that really determine priorities.

The highest rated single issue identified was the inability to precisely apply and measure torque during the assembly of the central shaft in turbine engines. This shaft is what keeps the engine together and is the point to which the turbine blades are attached. If this shaft is out of balance due to improper torquing (too much or too little), engine failure is eminent.

Step 4: Present the Results to the Design Team. Solve Customer Problems Using "Brain-net", assemble the most creative individuals to design the product that solves or eliminates the high-priority problems.

While the internal team recognized the potential for designing a new style of torque wrench, none of the employees possessed the skills necessary to create new solutions. Development II conducted several "Brain-net" sessions, using outside experts to help identify new techniques for solving this old problem.

Interestingly enough, during one of the sessions, an inventor offered his perspective of how to solve the problem. The issue with the torque wrenches then in use was that they applied force from only a single point. When the shaft under torque is viewed microscopically, there is more pressure applied to one side of the shaft than there is on the other. Torque wrenches looked like a base-ball bat, where the nut was held on one end and pressure applied to the other end of the lever. Accurate readings were virtually impossible, since it was a mechanical readout, fully dependent upon the strength of the operator, angle of the wrench, and age of the wrench. In the case of aircraft engine assembly, close enough was not good enough. This inventor theorized that if one could apply equal pressure around the shaft, perhaps at four equidistant points, uniform torque could be applied, giving a better balance to the rotating shaft.

Step 5: Build Prototypes. Develop actual prototypes, or simulation of prototypes, to validate the results of the design process.

Barnes Aerospace entered into a contractual arrangement with this inventor and hired Development II to act as the Project Leader to design and develop prototypes to test the theory. After one year in the lab, a successful prototype was produced. It was a very precise torquing instrument that did not look like anything currently on the market. The wrench encompassed four pistons and an electronic read-out displaying extremely precise torque measurements.

Step 6: Conduct a Concept Test to Determine Customer Acceptance. Test Solu-

tion Effectiveness Select Experts from your customers to assess how well the prototypes solve the high-priority items.

This new style torque wrench was loaded onto the corporate jet and flown around the world to be demonstrated to all of the leading turbine producers and airline overhaul shops in the world. It was also exhibited in several industry shows. Potential customers evaluated the torque wrench and made suggestions for improvement. These recommendations were incorporated into the final product.

Step 7: Commercialization

The time from the first Painstorming Session to first commercial sale was four years. This torque wrench has been listed as the specified torquing instrument by several of the leading OEM turbine manufacturers. Subsequently, Barnes Aerospace sold off this product to one of the original internal team members. His company, Advanced Torque Products, is very successful with the original four-piston torque wrench acting as the flagship in their catalog.