Industrial R and D

An industrial approach to product development

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Developing a scarcely defined idea into a marketable product is the essence of industrial research and development. This paper outlines an approach to product development using a centralised lubrication system pump as an example.

As the pace of technology increases and with it the evolving of new 'industries' the need for constant development by the ancillary equipment manufacturers is essential. Cost, efficiency, quality and reliability are among the key factors in industry and indicate the demand for highly specialised skills.

Lubrication is no exception to the need for progressive development. Correct lubrication of both the production machinery and the end product is essential and in a world of valuable natural resources (especially oil and its by-products) the problem and methods of lubrication will, during future years be of prime importance to the user of machine tools and machinery. Escalating prices of oil and grease will force sensible users to gain the last drop of service from the lubricant and the lubrication system manufacturers have the responsibility to design efficient systems.

Although the principles of delivering and metering lubricant from the pump to the bearings have shown little change for many years, constant development has been devoted to the mechanical components such as pumps, measuring valves, and the control gear.

To illustrate this need for constant development, the market research undertaken by Denco Farval Ltd, when approaching a new section of industry, namely the lighter industrial markets of machine tool, packaging and special purpose or custom built machinery etc., indicated a need for a more compact system.

Centralised lubrication for light industry

The initial objective was to design a fully automatic central station of suitable size and output to meet the demands of the lighter industrial field. The unit was required to be relatively inexpensive yet maintain the efficiency and durability established by existing equipment in heavy and hazardous industries.

It was also decided to design a completely new type of automatic reversing valve for this project. This unit would be incorporated for the widely used Dualine type of system and would provide automatic line changeover. Again complete reliability was essential but careful consideration had to be devoted towards physical size and cost of manufacture.

The results of the first design and method study indicated the possibility of using air as the motive power. A quick reaction from industry when this suggestion was tabled showed that electrical power was still the most acceptable method and this influenced future design.

A completely new pump was designed incorporating a unique line changeover arrangement. A prototype was built to the new design and subjected to a prolonged operating test. This test revealed minor weaknesses due to difficulties in sealing the internal porting and the reliability we have been accustomed to accept was not fully achieved. Also at this time further limiting specification was introduced and a production cost analysis resulted in the manufacturing costs being well outside the acceptable scales for a competitive product.

At this stage a decision was made to reappraise the need to develop a new pump. Further thought was given to the existing range with the possibility of adaption. Also to emerge at this time was the need for a manually operated pump incorporating the automatic line change feature. This unit would be used on Dualine systems serving machinery which required less frequent application.

In terms of physical size the long standing and reliable DA manual pump was the most suitable for review. On paper, the theory for adaption for both fully automatic and manual applications appeared encouraging. It was thought that our objectives could be achieved by attaching a separate assembly of the automatic line change mechanism to a modified version of the DA manual pump.

Automatic line change

The next obvious step and improvement was to incorporate the automatic line change as an integral part of the pump and form a single unit which would facilitate manufacture and influence production costs. Still in theory, the natural course of development was to actuate the new manual pump

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and combined automatic line change unit by a suitable electrically driven gearbox and actuating gear, to provide a small automatic central station. This would achieve a considerable amount of standardisation between manufactured components, which is desirable for all departments of a manufacturing company and benefits the customer over spares etc.

This form of construction, with minor amendments to govern pump discharge capacity, appeared at first sight to offer a new range of pumping units at very competitive prices as the company would only be involved in a minimal cost for new production plant. This ambitious theory proved to be somewhat incorrect as the production cost analysis highlighted various engineering costs and difficulties in achieving the extremely accurate precision porting arrangements. This high cost area was thoroughly investigated and it was decided to simplify the porting configuration. This, however, together with the limiting specifications introduced by prospective customers tended to divide original ideas into two separate channels.

Our development progress provided the solution for manually operated units and enabled further attention to be directed to the fully automatic applications. Following the design investigation, a new central station was eventually built. This incorporated the new automatic line change used in conjunction with an extremely reliable piston and cylinder arrangement, the pump being driven by an electric geared motor unit. It was possible to design this new central station to comply with the original dimensions laid down and exhaustive tests have been most encouraging.

Whilst some original ideas had to be changed due to manufacturing technicalities and production costs, others due to matters beyond our control, the building and field testing of this new equipment has proved the system. Altogether it is the result of a progressive development project which overcame the cost penalties in design and achieved the primary objectives of suitability to application, competitive price with efficiency and reliability.