Right-first-time - an approach to meeting the demands of today’s customer

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This paper concentrates on the management of quality and service. These have been major topics in the UK during recent years, as it is clear that only through good quality performance can the dyeing and finishing industry respond quickly enough to its main market place - the high street. The work done at Meridian Fabrics is described in order to illustrate the key ingredients that are necessary if a right-first-time approach is to be pursued meaningfully. With the use of financial models, the benefits of setting up quality improvement programmes are shown. These should be seen not only in the light of cost justification but also as a means of providing a competitive advantage in terms of customer service.

INTRODUCTION

As a general, and maybe provocative, statement it can be argued that the dyeing and finishing industry does not have a good reputation for quality and reliability. There is a mentality, perhaps based on tradition, that accepts that rework is part of our normal day-to-day practice. We expect things to go wrong, and we adapt correspondingly by being very good at firefighting and recovering situations. For our real survival and well-being we need to work better at fault prevention.

Perhaps there is need for an explanation as to what I mean by quality. It is the ability to provide the customer with what we have mutually agreed to supply, according to the agreed schedule. A definition commonly used is ‘conforming to requirements’, and this is totally acceptable and correct, but I want to emphasise that time, whether it be measured as turn-round period, or promised delivery date, must be seen as part of any quality concept. It is this ability and opportunity to respond quickly and accurately to the customer’s requirements to which we need to address ourselves.

As my particular involvement is the supply of weft-knitted cotton fabrics to both the underwear and outerwear clothing sectors, the majority of the experiences and details will be related to that apparel market. However, from general reading and discussion it would appear that the overall scenario is similar for most sectors, and indeed industries.

THE REASONS FOR A FIRST TIME RIGHT PHILOSOPHY

There are probably three areas that need examining if we are to justify the approach of a ‘right-first-time’ objective within business. These are:

(a) The market place - its expectations and requirements
(b) The competition
(c) The ‘in-house’ benefits of doing it - opportunity and cost saving.

The market place

The present retail scene is one of intense competition in the high street. The permutations of colours, their coordination in and across garments, and of style would appear to be limitless - there would seem to be no restrictions on the scope of designers in terms of technical inadequacies. The customers want choice, they want changes, and they also want value. This situation has been clearly put by Sir Ralph Halpern in describing the position for the Burton Group. ‘Today’s customers are more adventurous, more selective and more demanding than ever. They want a wider choice, with shop and product designs to match their changing tastes. They want better quality, more information and, above all, greater value for money. For Burton’s, successfully managing change is a way of life. Our ability to modify our offering as new moods and life styles emerge is our greatest asset’.

Such a market should be seen as being one of excitement and of opportunity: after all, the wide range of merchandise is what attracts the customer and provides our future. Correspondingly the retailers recognise and highlight to suppliers both the challenges and the dangers of their business. The impact of such an ever-changing situation on the supplier is that he has to be able to be more flexible in his servicing, and probably be able to work at reduced lead times and on smaller runs. Also, with decisions on colour often being left as late as possible, the concept of ‘quick response’ has been established in our industry and is now seen to be of paramount importance to our future. Support for this can be illustrated by assessing the cost of mark-downs caused by pipelines of unwanted merchandise and by looking at the extra sales
generated through providing a QR service (Figure 1). Such a facility can only be provided effectively on the basis of product reliability and a right-first-time approach. The greater our ability to respond, the greater the business opportunities that will be created. However, despite this, we should also remember three important factors that have been analysed within the clothing sector, looking towards the year 2000:

(a) There is forecast to be no overall market growth in clothing
(b) There will be an annual real price decline of around 2%
(c) Import penetration has tripled in the 15 years to 1985.

<table>
<thead>
<tr>
<th>U S retail clothing revenue losses (1986)</th>
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<tbody>
<tr>
<td>Mark-downs = 15%</td>
</tr>
<tr>
<td>Stock-outs = 4%</td>
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<tr>
<td>Excess inventory = 6%</td>
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<tr>
<td>Total revenue loss = 25% (Source KSA 1987)</td>
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<th>U K women's blouses and skirts</th>
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<tr>
<td>Mark-downs 1983 = 16%</td>
</tr>
<tr>
<td>Mark-downs 1986 = 21%</td>
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<tr>
<td>Courtaulds/Tesco Undercolour store trial (1987) - QR route to replenish fast selling lines = 6% sales increase</td>
</tr>
</tbody>
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**Figure 1 - Economic factors for introducing quick response facility**

So, it is not an ever-increasing merry-go-round: it is a tough market where customer loyalty will be earned primarily by the supplier who can provide value, service and quality, rather than by brand and home sourcing factors, although these will always have a bearing.

### The competition

This is not an area that I intend to develop within the paper. but it is imperative that we recognise that the competition today is not local, or even national. It is very much international, and therefore in terms of sourcing materials, whether that be fabrics, garments or dyestuffs, the competition is high. For example, in fabric manufacture we know that we will not compete on wage costs with the low-cost-base countries. We also have to recognise that the state of technology in terms of machinery and process control is such that the attainment of good quality production is readily available to those who really strive for it. However, it is salutory to recognise that there is a vast difference between having the tools, and actually using them effectively. Those of us who heard Clive Jeanes speak at the 1986 Society conference were surely impressed by the performance that Milliken Industries had achieved in quality performance and customer service. Indeed, Miliken is one of the top American companies cited by Tom Peters in his presentation on *The business of excellence.* They are the only textile company mentioned in that study. The competition should not deter or frighten us: we need to be aware of it, and in some cases (e.g. Milliken) we need to catch up with it. However, to establish a winning formula over the competition, it again comes down to knowing your market, knowing your customers, and being able and prepared to respond to their needs. The significance of price is greater in some areas than in others, but where it is not the sole criteria for making buying decisions (and it rarely is), we should still see opportunity through quality and service. And we can do a lot to help the fight on price by attention to a right-first-time philosophy.

### The in-house benefits of doing it

In the first place, by improving quality performance, it is quite clear that we create the ability to respond to the market demands. Lead times can be improved, on-time delivery performance will increase, stock levels can be reduced due to the greater customer confidence engen-

![Figure 2 - Model to illustrate cost of off-quality production](image-url)
dered, and the whole planning and production programming operation becomes a matter of scheduling versus capacity.

Secondly there is the straightforward cost-saving benefit which is perhaps the most powerful argument. It has often been argued by consultants on quality management that off-quality in an organization can amount to about 20% of the turnover. If the cost of off-quality in a business is calculated, then that is the size of the prize available for getting it right-first-time. Using some figures from our business, we have put together a hypothetical model to show how comparatively easy it is to approach the 20% level (Figure 2).

A further illustration of the benefits of a right-first-time approach can be provided by studying the effect that a 1% reduction of the reprocessing level would have. This can then be developed by assuming that this quantity could be replaced by the equivalent first time production (Figure 3). The calculations show that a saving of about £20,000 per annum would be made by reducing the reprocessing level by 1%. If we were to ‘replace’ that quantity of fabric which was no longer reprocessed with additional first-time production, then this would generate a further £30,000 profit.

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Value</th>
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<tbody>
<tr>
<td>Average weekly production</td>
<td>80,000 kg</td>
</tr>
<tr>
<td>Average batch size</td>
<td>250 kg</td>
</tr>
<tr>
<td>Average price for product</td>
<td>£2.20/kg</td>
</tr>
<tr>
<td>Reduction in reprocess level of 1%</td>
<td>800 kg</td>
</tr>
<tr>
<td>Variable reprocess cost (adjusting for mix of dyehouse and finishing related faults)</td>
<td>£0.50/kg</td>
</tr>
<tr>
<td>Savings per week</td>
<td>£400</td>
</tr>
<tr>
<td>Savings per year</td>
<td>£19,200</td>
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| By saving the reprocessing of 800 kg at 250 kg per batch, say three batches, this can be replaced by first time production. The average cycle time for reprocessing mix of dyehouse and finishing related faults is 4.5 h.
| Average standard cycle time for first time production | 7 h |
| Extra first time production | 3 x 4.5/7 x 250 = 480 kg, or 2 batches per week |
| Additional contribution | 2 x 250 x x 2.20 x 48 x 60% = £31,680 |

Figure 3 - Effect of reducing the reprocess level by 1%, and then filling the spare capacity with first time production

Similarly in the dyehouse, where in reality the money is either made or lost, it is well worth assessing the effect that no-addition (or blind) dyeing would provide (Figure 4). The example in Figure 4 shows that by making a 10% improvement in the number of no-addition batches, a saving of about £50,000 per annum can be achieved. This could be utilised for additional first-time production. (The illustration excludes the additional cost of correcting shade for blind-dyed batches, over and above the existing conventional method.)

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Value</th>
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<tr>
<td>Assumption for calculation</td>
<td>£45,000</td>
</tr>
<tr>
<td>Average batch size</td>
<td>250 kg</td>
</tr>
<tr>
<td>Average price for product</td>
<td>£2.20/kg</td>
</tr>
<tr>
<td>Blind dyeing cycle time</td>
<td>10.5 h</td>
</tr>
<tr>
<td>Average time per addition</td>
<td>2 h</td>
</tr>
<tr>
<td>Contribution to fixed costs + profit</td>
<td>60% of sales value</td>
</tr>
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Figure 4 - Effect on profitability on savings per addition (assuming first time production is substituted)

THE REQUIREMENTS FOR ACHIEVING RIGHT-FIRST-TIME DYING

An analysis of the work we are doing at Meridian to achieve first-quality production at the first time of asking shows that it is through a combined programme of four interdependent key ingredients:

(a) Employee involvement and participation
(b) Attention to detail across the business
(c) Closer relationships with both customers and suppliers
(d) Capital investment.

Before outlining the various initiatives, it might be beneficial to provide some background to what Meridian Fabrics is, its size, etc. It is a weft knitting operation processing mainly 100% cotton in most fabric structures for both the underwear and outerwear markets. It has been fortunate in that the demand for cotton weft-knit products has increased approximately 25% over the last four years. Its major customers are making-up units within Courtaulds and although Marks and Spencer merchandise occupies some 60% of production, it has significant volumes with the other main retail stores. In terms of dyeing and finishing, it processes approximately 80,000 kg per week, finished in either open-width or tubular form. Wet processing is either through a continuous bleaching unit (accounting for 30 tonnes) or through the batch dyehouse employing jets and winches (accounting for 50 tonnes).
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shades control, level dyeing, oil/dirt/stains, width
ness as we analysed our performance.
We included managers from every discipline in the busi-
originated with management and management systems.
approach to solving problems and Meridian believes this is
the best way not only to tackle quality. but many other
issues at work.
As a consequence managers. whose involvement and
value we had previously not considered. were introduced
to the drive on quality improvement. Previously quality had
been seen purely as a technical function to do with the
processing of the fabric, but now things were changing and
we were realising that the majority of the quality problems
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processing of the fabric, but now things were changing and
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originated with management and management systems.
We included managers from every discipline in the busi-
ness as we analysed our performance.
At the end of 1982 the average fabric rejection rate was
14%. i.e. for every 100 batches put into work, 14 were
either rejected within the factory or were returned by the
customer. In some weeks the figure would be about 20%.
So we concluded that this meant that one day each week
we were putting right what we had done wrong the
previous week.
We split the overall figure into the major rejection areas.
and initiated progress by forming project teams (normally
between three and seven people per team) for each of
those key areas. These included teams to look at. for
example, shade control, level dyeing, oil/dirt/stains, width
control; these four in fact were shown to account for about
70% of our rejections, so progress in these would have the
biggest impact. And that is what happened. Within 18
months the overall rejection level was below 9%, and by
the end of 1985 it was further reduced to 7.5% (Figure 5).
Gradually during the first year we introduced the concept
to the shop-floor, and operators took part in the various
teams. This helped considerably, in achieving a unified
viewpoint on the problems, and also of course because of
the workers’ knowledge about the real happenings in the
plant. What is even more satisfying is that, if there was a
bad week, the situation was quickly brought under control
by responsive action from the teams.
The mechanism for achieving these results is important,
because it did not happen of its own accord. Each team
was given some formal training in problem-solving tech-
niques, brainstorming, cause analysis, etc., and review
sessions were held within the business at scheduled six
weekly intervals. The teams would set their own targets,
and at the review meetings would inform each other of
what they were doing and the progress they were making.
These sessions were invaluable in keeping performance
monitored in both specific and also in overall terms. of
keeping people informed of the total progress within the
business. and in helping with new ideas and encourage-
ment.
Alongside those teams looking at the key issues regard-
ing the quality of the product were groups responsible for
the more general aspects of the business. So, for example.
we had an information team, a communications team and
a team for helping in the induction training of new
employees. A video was made and a booklet produced
focusing on quality for our employees, operators and staff.
These helped to build a solid foundation for the recogni-
tion of how important quality is to the business. and this was
shown in 1985/86 when there were some difficult deci-
sions to be made about the company’s structure. which
affected the industrial relations and the morale within the
factory but at no stage did the quality performance deterio-
rate.
During the entire life of the quality programme we have
always had a team. including the chief executive and
certain key senior managers, responsible for keeping a
momentum and for appraising progress in general. The
success of any such programme is highly dependent upon
how important quality is to the company’s structure. which
affected the industrial relations and the morale within the
factory but at no stage did the quality performance deterio-
rate.
Figure 5 - Rejection levels since commencement of quality
improvement programme (Meridian Fabrics)
In 1987 it was apparent that further real progress would be slow and probably unsuccessful unless we worked equally hard at other areas. And this is where the other three parts of our programme come in.

The next part of this exercise could be described as 'Attention to detail'. This refers to ensuring that:
(a) We understand exactly what it is that the customer wants
(b) We have correctly informed everybody concerned of those requirements
(c) We have put in place specifications and operating procedures for meeting those criteria
(d) We have adequately trained our personnel so that they are capable of doing their job.

This is where we believe that BS5750 (ISO9000) comes into the equation, and it is for this reason that we are preparing to apply for accreditation later this year. It is our intent to apply in respect of Part I of the standard, as this covers the design and development part of the business, an area that is crucial to the successful transition into bulk production whether of a new shade or of a new fabric. If we are really serious about right-first-time, then we must build the quality aspects in at the very beginning. Similarly we must be clear as to the specification for the product that we are producing and selling. Most of Meridian’s major quality problems and consequent late deliveries are due to one of the following causes:
(a) The bulk production cannot be matched to the sample on which the business was taken, or
(b) There is some part of the specification that was 'assumed' rather than ascertained. e.g. the shade actually required was to match a yarn-dyed trim, rather than to the official colour standard number that was given in the dyehouse plan and the customer fabric order.

These points may sound very straightforward, which they are, but they are not trivial. Success in this area requires a discipline and an attitude which previously has not been exerted. Questioning the customer about his actual requirements is not being awkward, it is being positive, and it shows a need and a willingness to work closer with him.

Sometimes it is possible to be too obliging, e.g. by taking on business or making delivery promises without adequate information. Therefore extra time spent when an order is placed can be invaluable and will go a long way towards improving customer satisfaction.

The setting up of the specifications and of the operating procedures is a hard and continuous task. We have spent some 18 months to date on this but unless the systems are in place (and are working and workable) then there is little scope for improvement. Training of personnel in all jobs can be put into the same category. As a ground rule, people don’t deliberately do things wrong - they either don’t know what is expected of them or they have not been shown how to do the job properly, or they haven’t been provided with the right equipment to do the job. There must be a lot of attention paid to training, particularly as flexibility across jobs is most important in providing good quality and quick response.

I have outlined Meridian’s need to work closely with its customers, and also in many cases with the customers’ customers - the retailers. This is not only essential for ensuring that we supply the correct product in terms of quality but also for planning and production control purposes. Production of complex garments incorporating different fabrics and colours and multi-colour packs of garments calls for regular communication and liaison throughout the process. Similarly, with the increased use of point-of-sale data, suppliers can react to their customer needs by anticipation and know-how. It is for this major market-led reason that Meridian has opted for batch dyeing equipment in which the machine batch size can vary from 25 to 500 kg. The ability to supply a very wide range of colours on all fabric components is what our customers require: if we are to operate in that market and be able to offer quick response and fast-track services, then the prerequisites are that we are flexible in our planning and machine range.

A similar rationale must follow in the company’s relationships with its auxiliary, chemical and dyestuff suppliers. We need to jointly examine their product ranges and expertise, in conjunction with our own processing capabilities and with our technical requirements. We consider it to be essential that our main suppliers understand our business, its needs, its restrictions and its strategies.

Consequently we tend to spend a lot of time with our main suppliers, not just in the form of day-to-day matters with the dyehouse or purchasing manager, but also with the nucleus of our management team in liaison sessions discussing our business, and then assessing possible development areas for that particular supplier relationship. We also discuss product performance as measured in our business. For example, each dyestuff supplier is aware of which shades are being dyed with his products, and what are the performance measures for those products, i.e. dyeing time, number of no-addition dyeings, number of additions per batch. This is invaluable for technical assessment and in price discussions.

The value of such dialogue being established through the chain cannot be over-emphasised because it is only through this means that a proper understanding can be built up.

Within Meridian Fabrics we have maintained a strong annual investment policy which has been well balanced across both dyeing machinery, finishing equipment and the appropriate computer support systems for both technical and production control. Our most recent investment has been on an automated dyeing system and while this is not unique in the industry we believe it is a first within the UK in our particular segment, i.e. for cotton weft-knit fabric.

It would generally be acknowledged that nowadays dyeing is not an art but a science. It is a chemical process, and consequently unless it is controlled the results will be variable. Within the batch dyeing cycle there are several important stages, each of which can have an effect on the ultimate shade and levelness. For several years Meridian has been working with its main suppliers of dyestuffs. dyeing machines, hardware and software systems, to custom build a network that will give total control throughout the dyeing cycle, from loading to unloading. At the end of 1987 we received approval to proceed with a capital project of approximately £1 million to install such a system.
It is the company’s intention to concentrate on batch dyeing using jet type machinery and to phase out winches. The ‘new’ dyehouse will operate with less machines but will have extra capacity because of greater efficiency in cycle times, machine loading and reprocessing levels. The winches are high energy and high chemical users, when compared with low liquor jets, and the state of our machines does not warrant expenses on individual machine controllers.

The network is built round three points, namely the dyeing machine, the dye kitchen and the computer system. Each machine has its own controller, which links through to both the computer and to the dye kitchen. Consequently each stage in the cycle is controlled and monitored. This means that the dyes and chemicals are mixed and dispensed on instruction, transferred to the addition tank and then passed to the machine at the predetermined rate and times. The whole operation is relayed through the computer so that within the dyehouse office there is a complete monitoring facility for each machine. This is capable of providing accurate factual information via a VDU, along with both batch and efficiency reports which can then be compared against the standard process. For a three-shift operation such information is difficult to obtain by any other method and will provide a real advantage over previous manual recordings. This system is therefore somewhat special in that it is a truly closed-loop operation, with all the hardware and software linked together and operating in unison (Figure 6).

There are a number of supplementary points that should be made in reference to such a project. In the first place it is necessary to have a machine base (a) that suits the production needs of the business and (b) that is capable of being realistically adapted for process control. Secondly the opportunity to build a new dye and chemical store and kitchen has provided the opportunity for us to rethink our material usage and purchasing policy. There has been a rationalization of dyes and chemicals - the system demands it - with a move to liquid dyes whenever possible. The health and safety aspects of reactive dyes in liquid form have been well discussed in recent years, and in addition these dye forms are more suited to automatic weighing and dispensing. Also the bulk storage of chemicals such as brine (which will be fed directly from a stock solution to the machine) and peroxide will provide major cost saving benefits. And finally the effect on people in the dyehouse and the type and calibre of person that is needed have to be taken into account. The role of the operator will have changed significantly, as will that of the dyer or shade matcher; adequate preparations have to be made and the necessary training and adaptations undertaken. We are also aware that this project will have put some restraints on our flexibility, though this should not be perceived by the customer. By reducing the machine base we will have to sharpen our planning and we will have to upgrade the overall productivity. But it is our belief that by making this type of investment, on top of the work previously described, we are driving ourselves to doing what the customer demands.

Analysis of the dyehouses performance over recent years, in conjunction with close support from suppliers like ICI and ICS/Texicon indicates that we have not made any optimistic assumptions. It will be an interesting time!
Similarly the story cannot stop there. The investment described in this paper is concerned with the control of the dyehouse process in bulk, and the next development for us must be to look closer at the impact of the raw material. While this must include dyes and chemicals, as standardisation here is obviously imperative, the major factors are the yarn and the fabric structure. We should now be in a position of confidence to set up, through the laboratory, a situation in which the dyeing recipe is fine-tuned for a specific yarn and/or structure, and which then can be repeated in bulk processing. We never expect to have one shade, one yarn source, or one shade, one structure. As long as we are processing cotton there will be significant variations. But we will have reached the situation where we can blind dye with confidence, irrespective of the yarn source or the structure.

CONCLUSION
I have tried to identify why a right-first-time approach is important, and then to pull together the elements to make it a reality. In our factory we are not there yet, but we have the people who are capable of achieving this. Our rejection level is still about 7%, our cost of off-quality goods is also about 7% and our delivery on time (measured as a fabric supplier as opposed to a dyeing unit only) is about 75%. Earlier this year we had a customer survey carried out for us by an independent consultant. This highlighted the following main points:
(a) Our general product quality is recognised as being good
(b) Our delivery on-time performance is reasonable, but it takes too long (i.e. our promised turn-round times exceed the customer's need)
(c) When something goes wrong, then it takes too long to put it right.

Similarly the consultant identified the need for a quick response in order to protect and to obtain business. Unless the quality of the product and of the business is founded firmly on a basis of a right-first-time philosophy and reliability, then there can be no achievement of QR because the accuracy of response will not be possible.

As a final message, I would emphasise that this type of challenge provides an exciting environment to work in. Investment in technology has been high in recent years, and we are visibly moving the industry towards the 21st century by our approach. The organizations that succeed the business chain, whether in purchasing, selling, production, engineering or technical. The acquisition and retention of such people will be one of the major requirements to achieve success. Hence the textile industry needs to respond by advertising itself as offering opportunity and challenge, it must set out to attract people of high calibre. They will have to be rewarded, but I hope that I have shown that providing such personal rewards are a small cost in the achievement of a successful business.

DISCUSSION

Mr R M Wynne University of Bradford Management Centre
I noted with interest your slides of hardware in the dyehouse. What systems have you installed to ascertain that the processes are ‘in control’? Many measuring devices and indeed the substrate are variable. In essence what systems are there to measure the variability and then reduce it?

Mr Farrington
In truth, the situation you refer to has not yet been addressed. We are confident that the installation hardware and software are the best available for our requirements, and that many of the variables in the dyeing process are removed. The use of SPC techniques to monitor the automated process will be considered. The substrate variations will, however, remain and this, through improved laboratory support to the dyehouse, is the next area for appraisal.

Mr P Mickler Evac
How much money was saved by improving quality?

Mr Farrington
An estimate of savings from the end of 1982 to mid-1988 is around £7,000. There have been no significant project costs to obtain this, the largest cost being for training, about £7,000. The savings figure is probably an understatement as we do not have figures on the no-addition performance in the dyehouse over this full period. However, for the last 18 months there have been savings in this area of between £150,000 and £200,000, therefore giving an overall savings of about £1 million.