

Quality and traceability

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The General Product Safety Regulations 2005 is a statutory instrument of the UK Parliament that demands that 'No producer shall supply or place a consumer product on the market unless the product is a safe product'. Many other countries have similar legislation requiring the company placing the product on the market to have carried out realistic and effective checks to assure themselves it is safe and fit for purpose. Should any complaint result in legal proceedings and a claim for compensation, these checks will form part of the due diligence defence that will be considered by the courts. To meet these challenges, there are a number of key steps that comprise this approach to due diligence.

When customers consider the purchase of shoes, they will often select products with a specific brand, one they have perhaps purchased before and with which they were satisfied. In their minds, the brand has become a recognised symbol representing quality and, hopefully, value for money. A brand's importance cannot be over-emphasised as it is a key element when shoppers decide on a purchase. Companies consequently spend a considerable portion of their marketing budget developing and maintaining their brand.

Nevertheless, few companies can exercise complete control over every step in a supply chain, stretching from initial conception of the design through to final delivery. Instead, it is more usual for strategic partnerships to be established. Such relationships see manufacturers working with design, material and component suppliers, and also resourcing companies and middlemen. Should a problem with completed products occur, pinpointing the cause and implementing remedial actions can be problematic.

Of the estimated 21.9 billion pairs of shoes made in 2013, possibly up to 2 per cent (around 438 million pairs) did not reach the required standard and were either sold below the required price or



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did not reach the market at all. If we assume a minimal value of \$10 per pair, this is in excess of \$4.4 billion each year. Aside from the financial implications, there is also the wasted effort and resources, as well as the problem of disposing of substandard products.

There are several critical stages in the development, production and distribution of footwear. If these are carefully and consistently managed, they will reduce—or even eliminate—the occurrences of faulty footwear. These stages are more complex and challenging than they would be if one single company controlled the entire process. Managing the supply chain therefore becomes the responsibility of a number of people who must work together and communicate effectively.

DESIGN & DEVELOPMENT

Many large brands or resourcing companies create new concepts that then undergo significant change and revision as they progress through the product development cycle. This may

occur thousands of miles away and in a very different time zone from the actual place of manufacture. Decisions made at this early stage should therefore ideally be made while taking into account the local conditions, levels of skill and availability of manufacturing equipment that will eventually be needed.

The choice of materials and components should be specified as precisely as possible or, if this cannot be done, then the physical and chemical standards documented. This is a critical step, as ensuring that materials and components are fit for purpose will prevent costly and time consuming mistakes, in addition to replacements later in the supply chain. Some materials, especially leather, may have already undergone significant travel and changes of ownership during their processing. This underlines the important role of laboratory testing and accreditation for this and, indeed, all materials or components entering the supply chain.

The process of compiling the specification for each product will usually take place in stages, using the input of designers, developers and costing personnel. Wherever possible, manufacturing personnel should also be included, as they will have a view on the local availability of materials, the need for any specialised equipment that may be required during manufacturing and the practicality of the intended processes. At this stage, it should be possible to list the operational sequence necessary to manufacture the shoe, identifying not only equipment that would need to be modified or purchased, but also any additional people or new skills that may be needed and which will require a training programme to be designed and implemented ahead of production.

As the information covering the materials, components and operations is compiled, the likely cost of manufacturing the shoe can also be created. However, simply assigning a numerical value to the amount of material or time necessary will not result in a realistic manufacturing cost.

MATERIAL UTILISATION

Materials that are cut into components require a different approach to costing than individual items such as insoles, box toes and buckles, which have a known cost and do not require any additional work before they are used. Any cut component will cause waste when the various sections are interlocked together during the cutting operation. Their shape, the number required and the dimensions of the material to be cut are key factors. In the case of synthetic materials, which are generally cut in multiple layers, there should be fewer issues with quality other than questions regarding surface texture or pattern. However, the temptation to stack a large number of layers to increase efficiency can often result in minor savings in labour at the expense of materials which are often of greater value.

If leather is being cut, there are the additional complications of shape, size, the lines of natural tightness within the leather and the variations of quality and surface appearance across the skin. Ideally, the leather supplier and the manufacturing company should agree clear and measurable standards of



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usability that reflect the customer's requirements before delivery begins. Recent surveys have indicated that the actual amount of leather needed to ensure the correct number and quality of cut components can often be over 50 per cent more than the area of the actual components.

LABOUR EFFICIENCY

Using a computer-based, pre-determined time system, it is possible to calculate precise operation values. As long as the system user can identify a realistic and sustainable working method, together with an achievable sequence for these operations, the actual time necessary to manufacture the shoe can be known at the design and development phase. However, establishing that an operation will take a known time is not the end of the process. The operation time is only valid if that particular operator is fully occupied throughout the working day. Very few operators achieve more than 75 per cent efficiency due to ineffective

planning and line balancing, as well as poor method engineering.

Most shoemaking operations will include an element of non-value added time, such as collecting the work, moving it at the work station, machine adjustments and waiting for the machine cycle. While some of this may be unavoidable, a careful analysis of the proposed operation can identify the potential for method improvement resulting in a lower operation time and, therefore, greater productivity. It is worth pointing out that, generally speaking, an efficient method will also result in less operator fatigue and fewer quality issues.

PROCESS CONTROL

The core of the product information is specifying the appropriate standard of physical and chemical properties needed by each material and component, and also detailing the sequence of necessary operations. Other key aspects which need to be carefully managed are actual conditions during these operations. Factors such as temperature, pressure and time must be continuously monitored and controlled to ensure the operation is performed correctly and the outcome is as intended. Many operations are carried out on equipment which displays these factors and thus can be easily monitored. This equipment should however be periodically checked for accuracy.

If it is not possible to easily see what the conditions are, secondary process monitoring can be employed such as heat sensitive crayons, pressure gauges and timers. It is possible to use simple devices that will warn when the process conditions have moved outside a pre-set range. If the process control conditions are found to be incorrect, it is critical that they are immediately addressed and any footwear already processed is inspected for faults.

PRODUCTION PLANNING

Despite the best efforts of development personnel, the manufacturing costs identified will be based on an assumed level of overall productivity. When the supply chain stretches over a number of suppliers there can be a significant difference in the level of efficiency achieved. Furthermore, each supplier may have

different equipment, skill base and cultural issues, such as payments and incentive systems, levels of supervision and working hours. The overall effect could be to affect the potential productivity that can be achieved.

The ideal situation is for a production line to be dedicated to a single product for an extended period of time comprising days and or even weeks which will allow the personnel to develop a level of expertise and familiarity, and so minimise lost time. It is not always possible to maintain this level of stability and frequent style changes will occur, significantly reducing the productivity that can be achieved.

Production planning personnel should attempt wherever possible to minimise style changes, as well as attempting to balance the line. In any sequence of operations, there will be a bottleneck. This is the operation which takes the longest individual time and often cannot be re-engineered or carried out by additional operators. It thus sets the overall level of productivity for the entire line. Other operations can be analysed to identify those which can be combined or re-engineered to ensure the supply of work to the bottleneck is constant. Any time lost due to delay or breakdowns prior to the bottleneck can never be recovered as, by definition, the bottleneck is already working at 100 per cent efficiency.

OVERALL TIMESCALE

The manufacturing phase of the supply chain is rarely the longest link in the chain. Supplier companies working efficiently can produce footwear in a matter of a few days and, in extreme cases, a few hours. However, unless these finished products are promptly transported to the market, and hopefully sold, much of the effort into raising productivity within the manufacturing plant will have been wasted.

Finished footwear represents a significant level of investment. The further along the supply chain that shoes travel, the more cost they incur. This investment is capital employed which incurs interest charges. Moving finished products as close to the final customer and as quickly as possible should therefore be a primary goal of supply chain management. This applies equally to the launch of a new range or replacement stock for



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footwear that is selling well. Efficient manufacturing (often using lean manufacturing principles) can be used to reduce waste within the actual production process, as well as a means of delaying the start of production.

The proven ability to manufacture footwear within a short lead time can allow production planners to schedule the start of manufacture close to the required delivery date, thus reducing the level of capital tied up as work in progress. Some of this capital will be invested in a reliable delivery chain for sufficient levels of raw materials and components, although this will be significantly less than financing finished products.

The actual length of the supply chain will of course vary depending on the type of product, the market and geographical issues. In most cases, though, the time taken to transport finished products from the country of manufacture to the market averages 29 to 35 days. It can take up to three at the port of loading and the same to unload and clear the cargo for onward transportation. When you add the time the products will be stored, the overall supply chain can be as much as eight weeks during which they can experience a wide range of conditions.

TRANSPORTATION ISSUES

Not all footwear is packaged traditionally in tissue paper and a cardboard box. To save cost, lightweight alternatives are used, including polystyrene containers, paper bags or even shipping the shoes in thin plastic to be properly packaged at the final market place. Whatever the method, it should offer protection during transportation and storage. Long periods of exposure to high temperatures and humidity can result in mould or discolouration as well as softening of adhesive bonds leading to sole attachment problems. Using wrapping paper impregnated with a mould inhibitor can help to minimise or eliminate much of this. Prolonged storage can also exacerbate hydrolysis leading to breakdown of both uppers and soles.

If continuous problems are experienced with products that have been damaged in transit or exhibit signs of breakdown at a later stage, it is possible to use miniature data loggers to record temperature and humidity during transportation and storage. Analysis of this can help to identify if, and when, the conditions that could be the cause are occurring. Finished footwear that has been correctly packaged and transported can also be damaged

during storage at the final destination, either at the wholesalers or within the retail environment. Over 20% of athletic footwear sold in the USA in 2014 was bought online. So, in addition to the storage and shipping that takes place throughout the industry supply chain, these one-in-five pairs of footwear sold online also need to be carefully packaged and transported to the customer's home.

TRACEABILITY

It is important to differentiate between faulty products that can constitute a safety related complaint and products which are considered aesthetically unacceptable by the customer. It is the faulty products which need to be identified and action taken to minimise or eliminate them. In most markets where footwear is sold in quantity, there is legislation to protect the customer from faulty or dangerous products, or those that are unfit for purpose. While such legislation varies between countries, the overall principle is that the company that places the product on the market has the responsibility to meet the standards as directed.

The most effective method is for the product to have traceability throughout its manufacture. All personnel involved at each stage of the supply chain have a responsibility to understand what is required for the product to be correctly made. They must monitor and ensure that this actually occurs, ideally using a carefully managed laboratory-based testing and inspection regime and, most importantly, record any problems.

Should a fault occur, either in the manufacturing process or when inspecting and testing materials and components, not only is it important to correct it, but also to be able to identify all of the footwear affected. Of course, incorrect or faulty products may not be identified until later in the supply chain or even during wear when the customer complains and returns the shoes to the retailer, and so the need to trace any other affected shoes is paramount.

DUE DILIGENCE

A serious issue with quality or fitness for purpose could result in a claim from the customer. Apart from the financial implications (compensation, damages and loss of sales), there is also the effect on goodwill, customer confidence and



Required standards should ideally be fully monitored using a laboratory-based testing regime and all problems recorded.

future sales. In extreme cases, where the complaint results in legal action, the ability to demonstrate that realistic and sustainable quality assurance was exercised throughout the supply chain (due diligence) can be critical.

Companies may increasingly be required to show that their supply chain maintained an acceptable standard of human rights, health and safety and environmental care. While these issues do not impact specifically on the quality of the individual shoes produced, companies which can show that they care about these situations generally experience a higher level of overall satisfaction. Personnel who feel safe and appreciated will generally perform to a higher standard and, by implication, produce consistently good work.

TRAINING

As well as the systems and documentation used throughout the supply chain, achieving consistent and acceptable levels of quality, delivery and effectiveness will depend on the people involved. Providing the necessary level of training is not only essential, it is also important to ensure this training is constantly reviewed and updated to reflect changes in materials,

manufacturing methods and equipment. The footwear sector often experiences a high level of labour turnover. This not only puts pressure on the training and retraining necessary, but also requires management throughout the supply chain to be aware of potential problems due to inexperience and unfamiliarity as operatives learn new skills.

Similarly, the introduction of new styles can highlight the need for increased awareness as production personnel become familiar with the changes. An additional issue can arise when the manufacturing company produces footwear for a number of different customers or resourcing companies which, by implication, can mean different quality standards.

The footwear supply chain continues to grow and change, presenting new challenges as innovative styling and materials are introduced. The final customer has come to expect ever-higher standards of consistent quality as achieved by electronic and IT products and footwear must strive to emulate this. A combination of realistic management processes, information and quality control and, most important of all, people skills, can help achieve it. 🧠