Is Mass customisation the way for Europe's shoe manufacturers to fight back against Far East production? The EUROShoE project would indicate that this is a distinct possibility. This complex project is reviewed here at its half way stage.

The EUROShoE Project

Mass customisation is now a key issue in many industrial sectors involved in the mass production of consumer goods. As there are many interpretations as to what this means, it is important to have a clear insight into the concept. A concise definition is quoted as "Mass customisation is to produce goods and services meeting individual customer's needs with mass production efficiency", but can it be applied to the footwear industry? The term customisation in this instance refers to changing parts of a shoe according to an individual customer's requirements. Breaking with mass and variant production, customised shoes are only produced against an end-consumer order and are based on pre-fabricated materials and components and where the degree of pre-fabrication can vary. Turning this statement into a technical reality as well as economic efficiency, is the aim of the EUROShoE (Extended User Orientated Shoe Enterprise) project.

Launched in March 2001, the project is co-ordinated by the Institute for Industrial Technology and Automation of the National Research Council based in Milan and involves thirty-four partners.

1. Style Customisation

Based on standard lasts and sizes, consumers can choose options of style, colour, materials and application, within constraints set by the manufacturer. This approach is not covered within EUROShoE as a separate market option but is included in the other customisation levels.

2. Best-Matched-Fit

Individual customer's feet are examined (foot scan only or in combination with biomechanical data) and matched to an existing library of lasts, insoles and soles, with a much higher standard of foot match than in a mass production system. Style customisation may also be possible within specific limitations.

3. Custom-Fit

Individual customer's feet are examined (foot scan and biomechanical data) and specific habits analysed, to make an individual last, upper, insole and sole for that customer. Additional style customisation may again be possible.

EUROShoE will provide answers for 2 and 3 - best-matched-fit and custom-fit concepts. These technical definitions have also to be complemented by a business plan to implement the opportunities of customisation as a commercial reality. The key task is to differentiate customisation, in the EUROShoE sense, from that traditionally provided by a craft shoemaker and this is where the concept of mass customisation begins.

Mass customisation in the footwear industry is therefore the manufacture of shoes which exactly meet the needs of each particular customer within a fairly large market segment. The shoes are offered at a price level similar or only marginally higher to that which customers are willing to pay for a comparable standard shoe. Thus, mass customisation does not imply a change of the market segment into small, exclusive niches, but would make customisation generally available. Consumers may be willing to pay a premium due to the benefits of customisation but long term, efficient manufacturing and delivery must provide cost structures comparable to today's mass production systems. This then is the target of the EUROShoE project: affordable customised shoes for large customer segments providing higher degrees of satisfaction for both consumer and supplier.

Progress to date

As a first step and necessary background research, the first six months of the exercise were dedicated to exploring the market and analysing and assessing consumer desires and interests. Everyone talks about customisation but are European consumers really interested? The interdisciplinary research team led by Prof. Frank Piller of Technische Universitat München (TUM), started to identify critical factors from a consumer's point of view. The team conducted an intensive multi level survey in four target countries (Germany, UK, Italy and Spain), which has revealed fundamental factors which can help the European shoe industry gain a major competitive advantage.

Fit and comfort have been identified as the primary criteria in the consumer's buying decision with regard to shoes and are the most important customisation parameters. They are the key added values for consumers, whereas colour, material and - especially for women, heel customisation, are interesting but not such vital considerations. Consumers seem to be rooted in retail based shopping and expect competent advice, particularly when shoes have several options for customisation. Standard shoe models in a broad variety are also needed, even in a customisation approach, as touch and feel is vital when buying such a fit critical product. The internet is rejected by almost 90% of consumers as a primary sales channel for standard shoes. However, 29% of women and 46% of men would consider buying customised shoes online, which is a window of opportunity for innovative multi-channel-approaches.

As regards price, consumers would appear to be prepared to pay an average premium of up to 30% on the standard store price dependent on the level of customisation available, difficulties encountered in finding adequate standard shoes and on the individually perceived added value gained by customisation. However, initial experiences of pioneering companies suggest even premiums of 100% may be acceptable for a high quality concept. The research partners believe customisation will develop rapidly over the next few years in the footwear, clothing and household goods markets. The majority of European consumers seem interested in customised shoes, with women more interested than men.

The concept is best received in northern European countries and an estimation suggests a market potential of about 40 million pairs of customised shoes in both the UK and Germany, 17.7 million in Italy and seven million in Spain. Even if mass customisation does not become the dominant system, these are not mere niche markets but promising market segments, totally uncovered today. Consumers will also become increasingly knowledgeable about the concept and increasingly demanding. There are huge opportunities for first movers mastering the technology needed and implementing new sales and marketing approaches. It is the objective of EUROShoE to make European footwear fit for mass customisation.

October 2002 finds the project half way through its planned path and findings from the market survey have been used to set the specifications for the different technology modules that will transform the concept into a viable business scheme. Moving from mass production to mass customisation, implies the adoption of a totally different technological approach that influences all processes in the shoe product life cycle - sale, design and manufacturing.

Specific areas

Intensive research effort has been dedicated to developing a new generation of foot feature capturing devices - as against foot scanners already available, with specific research in three different directions.

- Multi sensorial acquisition simultaneously of dimensional information of the foot and biomechanical data.
- Low cost portable scanning technologies to simplify this operation in low investment sale points.
- Web based scanning as a further future development.

Work in the three areas is well under way and the first prototype applications will be presented at the mid term project meeting in Oporto, Portugal, on 22 October. Scanning devices, though important, are not the only ingredients that will support the sale of customised shoes. Efficient product configuration software, an expandable consumer profiling system and an efficient data and communication system, are vital elements also under study.

A new generation of CAD is the main component of the customer orientated design process. It will be faster, more efficient (particularly in adapting basic design of last and shoe to individual customer-specific foot features) and more than anything else, knowledge based. Knowledge, on which the new CAD will rely, will relate to designing a good looking and well performing shoe, as well as incorporating biomechanic design or customisation rules in the process.

For actual manufacturing, a whole range of new machines and systems will be developed, all complying with the basic requirement of utmost flexibility and versatility. These span enhancing cutting operations, last milling, toe lasting and robot-based roughing, cementing and finishing operations. Also covered are handling of materials, components and work in progress by advanced automated transportation and logistic systems, plus computer planning and monitoring of every shopfloor operation. At the end of the development phase, a complete set of machines will be installed in an Integrated Production Plant (a small, self sufficient shoe factory operated by ITIA as part of a research unit dedicated to the footwear field) based in Vigevano, Italy. During the final months of the project, several thousand pairs of shoes, from the ranges of the six shoe manufacturers involved with the project, will be produced in thirteen different models, in both best matched and custom fit.

Last, but not least, since mass customisation is more than anything else, about handling and mastering digital information, a great deal of effort has been dedicated to analysing the organisation and operational mechanisms of the footwear industry. Advanced enterprise modelling techniques have been used to highlight changes that will become necessary from the organisational and information system viewpoint for the adoption of the new business approach. This data will support the selection and implementation of a complete and unique Information System.