

# **Session I - Part 2**

**4<sup>th</sup> February 2016**

**The title for this Session was**  
**“A Manufacturing based on the needs of the consumers”**



This Session was chaired by Mrs Satyam Srivastava, Footwear Design and Development Institute(FDDI), India and Mr Uwe Thamm, ISC, Germany.

- The **First Speaker** in this Session was **Mr Omar Sayed from Servis, Pakistan** and he spoke on **“Remaining Close to the Customer and Remaining on Top - Experience of Servis, Pakistan”**

Mr Omar Sayed stated that Pakistan was a US\$1.2 Billion a year domestic footwear market and added that in this market, a local Brand called 'Servis' had consistently matched any large Multinational Company in terms of scale and profitability. He elaborated that Servis was a 50 year old local brand in Pakistan and had used Brand Management, Positioning and extensive Consumer Research and understanding to stay on top.

He gave an overview of the Pakistan Footwear Industry and stated that it was a Rs 120 billion (\$1.2b) industry in 2015 and was growing at 7% per year with a breakdown of 35% market share of the organized sector and 65% controlled by imports and cottage industry. He added that there were only a handful of tax paying companies and the market was flooded with Chinese products, low quality and under-invoiced goods. He also listed out the Revenues of the Top 7 companies and also the major Urban Footwear Brands.

Mr Omar highlighted the 'Customer Centric Changes' carried out by Servis as Reducing Lead Times with Strategic suppliers where they had managed to shrink 'Order to Delivery' time to 45 days and had Brand managers leading product development rather than factory product development teams. He elaborated by saying that Servis was now the most recognized shoe brand in Pakistan with an ambitious and energetic Senior Management and they were ready to build a sustainable competitive advantage with more than 100 franchised stores. He emphasized that Branding and Customer segmentation was at the heart of business for Servis and they had the largest Ad spend in the industry, he added.

Outlining the plan of Servis over the next 5 years, Mr Omar stated that they wanted to build a world class supply chain and build their business through three channels namely retail, wholesale and franchise. He informed that they wanted to dominate in their 'bread and butter' category of footwear and planned to bring in new brands and store formats to cover all segments of the market.



In conclusion, Mr Omar spelt out the various Lessons they had learnt and stated that:

- Lesson 1 was: Creating a Strategy and aligning everyone to it is a tough task in large companies
- Lesson 2 was: A strategy without technology and innovation at its core will most likely fail
- Lesson 3 was: to watch out for the Consumer Behaviour Patterns, the Competition and the Government policies

➤ The **Second Speaker** in this Session was **Mr Victorien Picolet from CTC, France** and he spoke on **"Development of Senior Shoes, a New Direction through Biomechanics"**

Mr Picolet prefaced his presentation by stating that the senior population continued to increase and thus represented an important market all over the world. He informed that fifteen manufacturers carried out a new project to improve the senior shoe. He added that the way the footwear dedicated to this fragile population is designed is critical to limit injuries, pain and risk of falls and said that very few studies on the analysis of footwear adapted to the morphological and biomechanical changes in the senior foot had been conducted so far. He underlined that their study, therefore, aimed to quantify the biomechanical impacts of different footwear characteristics (heel high, insoles, etc.) in terms of locomotion and balance in order to improve the design of shoes for this specific population and informed that the results of their study indicated that wearing 3 cm high heels worsens balance and thus modifies locomotion. He added that the integration of textured insoles increased postural stability and thus reduced risk of falls and added that the optimal characteristics of such textured insoles to guaranteeing a better balance had been identified. He stated that backed by the results of their study, the benefits of biomechanical analysis for the design of shoes and present innovative biomechanical tools for these applications are vital for the development of shoes for senior citizens.





He informed that French Shoe Federation and CTC carried out a project : ADOCS to offer improved shoes for senior citizens alongwith 15 Shoe manufacturing partners. He briefly outlined the objectives of their study as to know the morphological changes to the senior foot ; to analyze the shoe characteristics that influence the balance and walking of elderly and to design a new generation of shoes adapted to the senior population. He described the Morphological modifications, Physiological modifications and the importance of two main parameters namely Heel and Insole. He added that **the shoe characteristics that influence the balance and walking of elderly were analyzed** Using Biomechanical tools and described the conclusion as being that Textured insoles could be a simple way to reduce the risk of falls for elderly people as it resulted in an improvement of postural stability when increasing the plantar stimulation and added that their study concluded that **3 cm heel and textured insoles were the parameters required for the footwear for senior citizens as this what limited their risk of falls.**

- The **Third Speaker** in this Session was **Mr Bruno Marelli from Oom Exports Agra, India** and he spoke on **“Made to Measure Shoes in Mass Production”**

R Bruno Marelli described this concept as “m2m” and said that it was the most advanced way to produce made to measure shoes in an industrial production process. He added that in the production side we had needs that required investments and efforts to be realized, but not in the least odd or complex and opined that the real difficulties were all in the marketing side. He stated that while all the other problems could be passed as the technology required was already available and tested, the market still remained for us the jungle where everything was difficult and hard to be achieved. He underlined that it is for this reason that m2m was more than an industrial improvement; it was the way to handle the marketing challenges related to such a big step forward. Mr Marelli stated that we could make the shoe as per the specification of the feet of an individual even if it varied in the length or height and added that the sole would not be stretched or compressed to meet the feet size but it would be exactly as per requirement. He further stated that we could also make the shoe in which we could provide extra hardness or softness at the place where the individual needed it – with NO CHANGE OF MOULD and also we could change bottom design and side profiles, not superficial but drastically again with NO CHANGE OF MOULD.



Mr Marelli talked to us about how the concept of m2m works and what it really means to produce a **m2m shoe in a mass production plan**. He stated that a **m2m shoe is absolutely not a shoe designed from scratch following the final customers measures and request and described the process starting with a 'last'** and a scanned 3D image of the customer's feet. He elaborated that the parameters that needed to be considered were **length and the the volume of the INSTEP**. He further stated that **we needed to** modify the central part on a standard last while the two areas are identified as transaction areas to the unmodified parts **of the and heel**. He added that the Insoles and soles could now be cut by a CAD/CAM system with the information controlled by the m2m software. In the latter part of his presentation, Mr Marelli described as to how to customize a moulded sole with NO CHANGE OF MOULD and how we could mould a sole in pieces and assemble it on a modified last and insole.





- The **Fourth Speaker** in this Session was **Mr Miguel Angel Martinez from INESCOP, Spain** and he spoke on **"Lessons from 3 examples on Customized Footwear Projects: Technology Perspective"**

Mr. Miguel Angel Martinez commenced his presentation by stating that during the last decade there had been an increased interest in customized products and footwear has been also in the wave and added that available technologies had permitted to create digital workflows from foot scanning to last and footwear design and opined that the commercial reality today, however, was that customized products were still a drop in an ocean of produced shoes. He presented a review of 3 cases where technology played a relevant role and analyzed to show how different brands have afforded the customization issue with different results and success levels. He elaborated that these cases were a case for lady shoes in the US market, a case for men's shoes worldwide in specialized boutiques and a case of luxury men's shoes in shops and he proceeded to present and analyze them. He stated that in all the cases the companies used advanced tools at different stages of their business processes in foot scanning, data processing, last and shoe design or even e-commerce, with different results.

Mr Martinez informed that there were different degrees of Customization and said that the different ways of Customization could be through a Physical Shop or an Online Shop or through Mobile Devices like Tablets and Smart Phones and graphically illustrated each of these. He said that from idea to sales for Customization Digital Elements of the Lasts, Soles, Upper Materials and Decorations were required while the Hardware requirements were required for foot size measurement and the Software requirement comprised of Model design, Foot last matching and Model configuration.

He described the process as starting with the Footwear Last Scanning and Editing, Material Scanning and editing, Footwear Model Design and Configuration, Scanning, Measuring and Foot-Last matching, Footwear configuration, Choosing a footwear style and making modifications desired, choosing the outsole, connecting with the scans and matching, rendering the final model selected, changing the materials, changing the sole and finally manufacturing the customized shoe and delivering it to the customer.



## **Session II - Part 1**

**4<sup>th</sup> February 2016**

## The title for this Session was “Intelligent Factory and Smart Supply Chain”

This Session was chaired by Mr Ricardo Guerra Sanchez from CIATEC, Mexico and Dr Bhabendra Nath Das from CSIR-CLRI, India

- The Introductory Presentation in this Session was by **Mr Cesar Orgiles from INESCOP, Spain** who spoke on “Footwear and Technology Base”



Mr Cesar Orgiles stated that Footwear manufacture had always been associated with descriptive terms that were not of much help for it to be considered as something interesting for the future: traditional, handcrafted, labour-intensive, low added value, ... However, those who worked for the Sector should appreciate its strengths with respect to other technology-based sectors that seemed to be the only ones to be considered as the sectors of the future, he emphasized. Mr Orgiles added that the continuous incorporation of advanced materials, computer-aided design technologies, automation, or even robotisation, should make us feel proud of implementing a larger technology base than that of many other sectors.

Mr Orgiles described the process of 'Manufacturing Technology based Footwear' and graphically described the various processes of : **TECHNOLOGY INNOVATION, NANOTECHNOLOGY, BIOTECHNOLOGY, BIODEGRADABILITY, ROBOTISATION, SHOE LAST DESIGN, HEEL DESIGN, SOLE DESIGN, PATTERN ENGINEERING, GRADING, CUTTING, ARTISTIC DESIGN, FOOT SCANNING, DIGITISATION OF SHOE LASTS, BESPOKE FOOTWEAR, CHROME-FREE LEATHER, BIOMATERIALS, ENVIRONMENTAL MONITORING, DATA EXCHANGE, VIRTUAL REALITY, AUGMENTED REALITY, DEFORMATION IN THE MANUFACTURING PROCESS and CONTINUOUS CONTOUR RECOGNITION.**

- The **First Speaker** in this Session was **Mr Michele Cantella, from ATOMLab, Italy** and he spoke on “Advanced Man Machine interfaces for the Factories of the Future”



Mr Michele Cantella stated that Shoe machines have become in time complex mechatronic systems that incorporate various levels of software control and that require attentive and skilful operators for their efficient functioning adding that this was particularly true for the modern generations of dieless cutting machines currently adopted both for prototype and sample making and more and more in production. He opined that the technologies commonly used by these machines to communicate to the operator all the relevant process parameters and to allow him to effectively layout the patterns to be cut, are the result of a constant perfecting and improving of concepts introduced more than twenty years ago. Displays, projectors, laser systems, keyboards and mice were the state of the art in the so-called man machine interfaces, he added and said that a new breed of modern technologies could offer interesting alternatives like wearable devices, augmented reality, gestural interfaces which were becoming common elements in gaming as well as in some industrial applications. He presented the on-going work at ATOMLab, the research and innovation division of the ATOM group, worldwide leader in shoe process technologies, in the field of advanced man machine interfaces that, he said, were due to become the standard of the next generation of cutting machines (but with possible applications also in other fields and other process phases). He opined that this would introduce a totally new approach to man to machine communication with potentially disruptive effects similar to what happened with the appearance of the first keyboard-less smartphones with touch screens.



He gave a brief introduction of ATOMLab and the work being carried out there. In his presentation, he said that factories of the past used to rely on human labour and workers' skill; no machines to interact with: just eyes, hands and simple tools and opined that perhaps shoe factories tomorrow will certainly call for new ways for the workers to interact with their machines with Tablets and other similar devices. He added that Cutting leather had always been a matter of eyes and hands - Eyes to see and inspect and hands to move and place the cutting die where the skill of the operator suggests and added that Modern Cutting machines despite the technological advancements, the operators still needed their eyes and hands to manage the cutting process, but now they had to interact with the machine and its hardware and software systems. He elaborated that the current generation of dieless cutting machines still use relatively "primitive" interaction devices, legacy of very early IT paradigms but in the 'New Paradigm' Smartphones, tablets and other modern electronic appliances have introduced radically new ways of interacting with the devices. Talking of 'Touch and Gesture', he stated that Tapping, pinching, swiping with the fingers on the touch screen have become the natural way to command our devices.

Mr Cantella then spoke about 'Wearable Devices' which he opined were the new frontier and added that researchers thought that 2016 would see an explosion of wearable devices, Smart electronic devices would be more and more embedded in shoes, garments, bracelets, eyeglasses, goggles and helmets, he added. He stated that we were on the threshold of 'Augmented Reality' (AR) which he described as a technology that superimposed a computer-generated image on a user's view of the real world, thus providing a composite view and added that in an industrial perspective, AR allowed to see better the surrounding environment and to see more of the digital data that could be associated to the environment, specific objects and also to shoe patterns.

In conclusion, Mr Cantella stated that a few messages to be taken home were:

- Man machine interaction is a crucial aspect in the design of modern efficient manufacturing equipment
- Traditional ways of interacting with the machines are the legacy of the early years of the IT era
- Augmented Reality combined with other technologies can provide a modern and effective answer to this innovation need
- A whole new breed of interesting AR, wearable devices is entering the market
- The application to cutting machines although complex is not impossible and certainly worth being investigated

- The **Second Speaker** in this Session was **Dr Gautham Gopalakrishna from CSIR-CLRI, India** and he spoke on **"Material Optimization and Computation of Footwear Consumption Norms"**



Dr Gautham stated that Leather was the single most important component of a shoe and every attempt must be made to optimize its usage by minimizing its wastage and added that Rule of thumb procedures to arbitrarily fix the norms by adding an approximate percentage of waste over and above the traced out area of the upper patterns could lead to a lot of inaccuracies in arriving at the norms for cutting and consequently affect the profitability of a company. It is therefore imperative that an accurate method of computing the consumption norms be adopted, he emphasized and underlined that the methodology followed in developing the algorithm for the software was based on precisely such a scientific premise.

He gave the Methodology followed **and commenced with the Preparation of Upper Leather Allowance**, where he said that the objective was to take a set of upper patterns and to accurately

predict the Area of Leather that would be used when those patterns were used to cut up Leather for an order.

**He gave a detailed description of the procedure to be followed as:**

1. Layout the patterns as described in 'Procedure for Pattern Scaling'. This figure included the 'first waste' or unavoidable interlocking waste.
2. Using the 'Second Waste Table' add the percentage that describes the relationship between the 'average pattern size' and 'skin size.'
3. Add an allowance for the 'type or shape of leather.'
4. Add an allowance for the 'Quality' or 'cuttability' of the leather.
5. Adjust the 'Clickers Area allowance' for any inaccuracy in the measurement of the skin. Tanner's measures can be inaccurate.
6. Adjust the 'scale figure' for the 'average shoe size of the order.'

He illustrated each of the above 6 parts of the procedure with examples and computed a sample Norm for Leather Consumption for a style.

He then went on to describe "The Innovative Footwear Norms Estimator" which is an automated algorithm conceived, designed and developed by CSIR-CLRI, India towards minimizing material utilization and estimating the product costing. He added that it was standalone software to establish a standard system for measuring shoe patterns and upper materials to produce computerized cutting allowances and costing. It is fast and accurate and allowed users to interactively monitor and control material utilization, he stated.

He emphasized that an accurate figure for estimation of Leather Consumption was essential because the 'Leather Consumed' was the largest single item of cost in the total cost of the Product and the profitability of any company depended on accurate costing. He informed that this could also be used as a basis for incentive payment or as Leather Saving Bonus.

Extolling the virtues of the software, Dr Gautham informed that this was developed on a JAVA platform and that this Windows based software was unique because Patterns could directly be scanned or imported in as a 'dxf file' independent of any CAD system. He added that apart from calculating the parallelogram area i.e. First waste, Second Waste due to the Average Pattern Size, Third Waste due to the 'CUTTABILITY' of the Leather, the program was also able to compute the Clicker's footage incorporating a lot of essential parameters such as leather coefficients, leather grades, coefficients for size & fit, adjustments for average size of order etc., thus arriving at an accurate computation of the consumption norms for any footwear style.

In conclusion, he stated that this software would find readymade application in any footwear manufacturing unit for use in deciding cutting norms, estimating clicker efficiency, accurate costing and optimization in material usage.

- The **Third Speaker** in this Session was **Ms Maria Jose Ferreira from Centro Tecnológico Do Calçado De Portugal** and she spoke on **"High Speed Shoe Factory"**

Ms Maria Jose Ferreira stated that the footwear industry was traditionally characterized by production units consisting of sections (cutting, sewing, assembly, finishing), physically separated from each other and with autonomous organizational and management processes. This type of organization, she felt, created several areas of intermediate stocks, large production lead times, excess of materials and product handling, thus long delivery times and people in activities that do not add value to the products and processes. In this context, she opined that, High Speed Shoe Factory project which developed and implemented a new model of footwear factory for quick response, able to produce pair-to-pair, in order to satisfy internet sales, small orders, quick replacements in stores, as well as manufacturing of samples for new collections was the answer. She elaborated that the shoe production was designed in a logic of a "single section" with high flexibility, applying agile and reliable technological solutions, which ensured the versatility of multiple processes operating simultaneously. She enumerated the technologies developed which included a) Interactive online sales system based on an online shop incorporating footwear research and suggestion algorithms, b) New multi tool cutting system and c) Integrated logistics flexible production system, which crossed in a single step, the traditional productive sections of cutting, sewing, assembling and finishing. She informed that the



project involved 5 industrial partners and 3 RTD that were able to redesign the footwear process to meet the needs of new purchasing realities with agile response. A fully operational Pilot Line was installed in a representative Portuguese Footwear manufacturer, she added.



Ms Ferreira stated that the main goals for the 'High Speed Shoe Factory' model was to obtain an 'Agile Response', eliminate pair-to-pair production and stocks elimination, encourage online sales, efficient production of samples and new collections and ensuring Flexibility and Versatility. The Approach, she said, was to Integrate in a 'single productive phase' the Cutting, Stitching, Assembly and Finishing with the support of an 'Internal Logistics Team.'

**In conclusion, she flagged the 'Future Trends' as:**

- **Digital Factories**
- **Horizontal and Vertical System Integration**
- **Industrial Internet of Things (IIOT) with Cloud Data Analytics**
- **Robotics**
- **Growth of Mobile, Anywhere, Anytime Computing**





