Annals of DAAAM for 2010 & Proceedings of the 21st International DAAAM Symposium, Volume 21, No. 1, ISSN 1726-9679
ISBN 978-3-901509-73-5, Editor B. Katalinic, Published by DAAAM International, Vienna, Austria, EU, 2010
*Make Harmony Between Technology and Nature, and Your Mind will Fly Free as a Bird*
*Annals of DAAAM International*

# INNOVATION MODEL FOR SUSTAINABLE DESIGN & PRODUCTION OF SHOES TEXTURES

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***Abstract:*** *This project aims to optimize texture of uppers, both in draft / design, as in the production stage, to propose that a model based on the design and manufacture modular, allowing the development of new products ever more profitable, thus creating the necessary tools for Eco-Manufacturing. This improvement project includes a first phase a study of the universe of textured soles, in their different social backgrounds and geographical boundaries, for it to develop a modular concept of reuse and adaptation of textures depending on different problems. In short, the project aims to reduce production costs, within the area of the molds.*
***Key words:*** *Textures; Eco-Manufacturing; Eco-Design; Cycle-of-Life, Surface Roughness*

## 1. INTRODUCTION

This work has as main objective to propose a model based on the design and manufacture modular, allowing the creation of new products increasingly profitable, the concept of texture of the soles, creating the necessary tools for the Eco-Design and Eco-Manufacturing an footwear company, from design to production in order to standardize the different parameters at both, socially and geographically, thus creating a new concept of thinking about the textures of the soles, due to its standardization in product design, options manufacturing, assembly systems, quality control and recycling should be considered together.

The environmental acceptability of a product is the turning point of the new century, as the issues of recyclability, use of appropriate materials and a lower overall energy consumption, became part of a competitive strategy of companies. To integrate the design of the product from design, selection of material still in the pre-project, the products are considered, also in the strategy of design and manufacturing for the injection molding of the soles with the life cycle of the mold. An integrated design and production requires a complex integration of different sources of information and knowledge that are associated with the design, engineering and production. So, and need to develop standards for representation of information, with the ability to interact with the software most used by industry.

## 2. INITIAL CONSIDERATIONS OF LINES OF STUDY

After a search by several working groups the design of the soles and their textures always depends on universal situations.Not taking into account a person's weight, type of pavement where the person moves or the person's age. The texture almost always depends on the creativity of the designer. Existing studies mainly concern the relationship ergonomic foot with the shoe, the wear of the soles, their friction, the relationship of the shoe / sole with health and texture with the patterns of motion (Robert E. Heymann 2008). Using a suitable footwear prevents the problems caused by the absorption of the impact of vertical forces, such as protecting the base of the foot injury, and keeps the foot in a correct posture to avoid muscle fatigue and excessive inflammation, and allow adequate blood return venous blood, improving circulation.

In other works (Roberto E. Heymann 2008) ongoing research, in developing a more realistic test for measuring the slip resistance of shoe soles, so you can determine the effectiveness of unique patterns, and materials and surfaces single floor. The forces of friction between the shoe and the ground were measured in normal feet, using a force platform and photographic techniques. This led to the development of an experimental test that reproduces the conditions of slip of a foot. Using this test, it was found that the severity of sliding friction depends on the changes with the movement of the footwear. Furthermore, a single measurement of friction may not be sufficient to completely predict the slip resistance of a shoe sole. More work is needed to understand the complex nature of slip resistance between the sole and the ground.

When the products are considered, the strategy of design and manufacturing of mold should be considered along with the life cycle of the mold. An integrated design and production requires a complex integration of different sources of information and knowledge that are associated with the design, engineering and production. It will therefore be necessary to develop standards for the representation of information, with the ability to interact with the software most used by industry. Reducing time to market, the assembly of the product to customer specifications, maintaining an efficient and low cost, and a final product quality are the goals to be achieved.

An intelligent system of knowledge that a child working environment to assist users in estimating ede manufacturing processes of development at the design stage of the life cycle of the product allows for a faster response to customer expectations. The main function of the system, besides estimating the cost of the product is designed to generate the initial planning process to include the production and selection of manufacturing processes, their sequence and its parameters. Therefore, the developed system differs from the procedures of decision making conventional systems, as it is structured to support concurrent engineering. It is represented by techniques of hybrid knowledge representation, such as production rules, frames and object oriented. Based on the analysis of the life cycle of the product, the estimated cost includes materials, processing, machine / production and the costs of production.

Design is the first step in the production, and is where most major decisions are made that affect the final cost of the product leading to reduced product cost, better quality, faster time to market, lower inventory, fewer suppliers, and many other improvements. It should highlight the importance of taking into consideration the care of the problems of manufacturing and assembly in the early stages of product design.

## 3. METHODOLOGICAL PROCEDURE

This work studies a new type of modular design in the concept of texture of the soles in order to standardize the different parameters at both, socially and geographically, thus creating a new concept to think about the textures of the soles,

making a kind of greening project, due to its standardization. The parameters that exist today are primarily at the level of material, such as average roughness (Ra), maximum (Ry), total (Rt) and partial (Rz). The product design, manufacturing options, assembly systems, quality control and recycling should be considered together. When the products are considered, the strategy of design and manufacturing of the mold must be considered along with the life cycle of the mold. An integrated design and production requires a complex integration of different sources of information and knowledge that are associated with the design, engineering and production. It will therefore be necessary to develop standards for the representation of information, with the ability to interact with the software most used by industry. Reducing time to market, the assembly of the product to customer specifications, maintaining an efficient and low cost, and a final product quality are the goals to be achieved.

## 4. DFA E CONCURRENT ENGINEERING

We can define the Concurrent Engineering (CI) as a method of work where the various engineering activities that comprise the process of product development and production that are integrated and run in parallel. This approach to job-sharing group of Concurrent Engineering does more than a working group at some point in the project. However, Concurrent Engineering is not just a project management methodology. Its key elements include:

-Multidisciplinary teams.

-Parameters of the project to ensure final product quality.

-Design for manufacturing and assembly (DFA).

-Development of the product simultaneously, manufacturing equipment, process control quality, marketing.

The purpose of the DFA is trying to simplify the product in order to simplify both the assembly and disassembly, thereby reducing its cost.

## 5. RAPID TOOLING E RAPID MANUFACTURING

They are two of the strongest alternatives to respond to market needs with respect to the acquisition of prototypes or small series, when it comes to delivery and production costs. Present a vision of medium and long term technological trends in the industry, notably those related to the production of plastic parts.

There is a clear need to develop an integrated system, including the various stages of design and manufacturing, lending to a more flexible and cost-effective production of injection molding for plastics. An appropriate integrated system should be based on the principles of Concurrent Engineering (CI), which considers the factors associated with the lifecycle of the product. In the case of injection molding the life cycle ends with the storage and subsequent destruction. Analysis of recycling or reuse of injection molds is introduced as an innovative element in the life cycle of injection molds.

## 6. INJECTION OF REUSABLE MOLDS

The current state of processing plastic brings the need for a solution for injection molds that have completed their production cycle and are kept stored until they are finally destroyed or deteriorate. The reuse of injection molds seems to be a possible strategy to be followed by producers of plastic parts. Hence the need for an integrated project methodology and manufacturing of injection molds should be viewed keeping in mind the objective of innovative reuse instead of recycling simple. From the design and production standpoint, you would think the quickest solution to the reuse of the mold was to start with the existing structure. This alternative has a number of difficulties, as the structure of the mold, it has been designed according to the specifications of the injection to be manufactured. At this point, the requirement for reuse was not expected.

## 7. KNOWLEDGE-BASED IN EXPERT SYSTEMS

Due to the complexity and number of activities that are involved in the activity of design and manufacture of reusable templates, there is a need to develop a support system to try to coordinate the various activities involved and support decisions made in each. This system should integrate the development of the draft order on the one hand, technology, production methodology based on concurrent engineering and computing technologies on the other. Thus, one must acquire diverse knowledge common design and manufacture of molds, data and assistance systems for creating geometries. Overall we are proposing a project such as reusable knowledge-based (KBS, Knowledge-Based System).

## 8. ROUGHNESS PARAMETERS

Average roughness (Ra) - It is the parameter used. Mathematically it is the arithmetic mean of the absolute values of the ordered expulsion (yi), the points of the surface roughness profile in relation to the midline, within the measurement path (lm). This quantity may correspond to the height of a rectangle whose area is equal to the sum of the areas bounded by the absolute surface roughness profile and the midline, and by the measurement path length (lm).

## 9.CONCLUSIONS

This study evaluated the use of different components in creating textures on the shoe soles. This assessment mainly been made in order to study the influence of different components in the final characteristics of the product injected.

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