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## DEVELOPMENT OF NEW PRODUCTS IN INDUSTRY OF UPHOLSTERED FURNITURE

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**Abstract:** This paper presents the development phases of new products in the upholstered furniture industry, ranging from market research to mass production. During the development of the new products, teams of experts from various fields are included, such as: mechanical engineering, chemistry, architecture, economics, which has been discussed in this paper. Also, for preparation of this paper has been used CAD/CAM technology, without which is unthinkable to develop new products today. The emphasis, during the development of new product, is put on flexibility of product, price, quick and simple installation, improvement of productivity, materials, environmental standards and specifications, transport and packaging, marking and identification of products in stock, technical documentation, making the zero batch and, at the end, batch production, i.e. at all stages and elements essentials for the development of new products, which target is competitiveness in the market of upholstered furniture.

**Keywords:** phases of development, new product development, upholstered furniture

### 1. INTRODUCTION

Development of new products in the upholstered furniture industry is very intense process because on the market for these products there is great competition. In the framework of a company there is a need to develop up to 50 new or modified products, during the year. Considering the above, the conclusion is that the development of a new product, on average, engineers (the company) is available for about 7 days. The aforementioned time period is very short to implement ideas into parts, or finished product. Teams that participate in the development must be well coordinated in order to achieve the mentioned period required target. Various manufacturers have developed their own ways and methods used in the development of new products. In Figure 1. the screen shows the basic stages of the life cycle of any product. Of course, these stages are also valid for the upholstered furniture industry as a starting point and orientation in the development process [1].

During execution of the product development process, designers must take into account all stages, starting from the idea through the end of a product life cycle that ends in recycling. In this paper, attention will be paid to the early stages of design and production.

Experience shows that the biggest problems that arise in the process of product development are communication between teams, defining responsibilities among team members, compliance with the defined term, the distribution of tasks and duties. Therefore, it is necessary to create a functional team, using positive experiences, so-called. "Good practices" and using proven scientific postulates the formation of teams in product development [3], to take advantage of all the possibilities of effective teamwork.

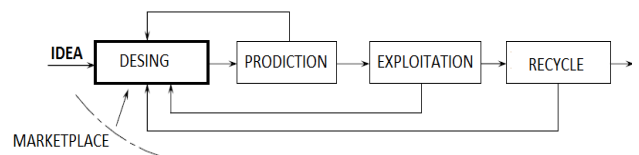


Figure 1. Life cycle of the product [1]

Table 1. Designated parameters in product development (values are approximate) [2]

	Screwdriver	Rollers	Printer	Furniture	Car	Airplane
Annual production	100 000	100 000	4 000 000	1 000 000	100 000	50
Life expectancy	40 y.	3 y.	2 y.	10 y.	6 y.	30 y.
Individual price	6 \$	200 \$	130 \$	1000 \$	20 000 \$	200 000 000 \$
Number of components	3	35	200	100	10 0000	130 000
Development time	0,5 y.	1 y.	1,5 y.	0,5 y.	3,5 y.	4,5 y.
Internal development team	3	5	100	50	800	6 800
External development team	3	10	75	30	800	10 000
Price of development	150 000 \$	750 000 \$	50 000 000 \$	1 000 000 \$	400 000 000 \$	3 000 000 000 \$
Investment in production	150 000 \$	900 000 \$	25 000 000 \$	3 000 000 \$	500 000 000 \$	3 000 000 000 \$

Table 2 shows the specific parameters involved in the development of new products for different types of products, from the simplest to the most complex. It should be noted that the examples presented here are related to the brand-new products, where new materials were used, working principles, ways of making ... [2].

## 2. NEW PRODUCT DEVELOPMENT PROCESS (FURNITURE)

New product development process is presented through a concrete example made in a factory of upholstered furniture. At issue is product development (corner sets) for foreign market, the group of potential buyers from 30 to 50 years, from the middle price group, which means that the factory selling price should revolve around 1000 km and the product should look in line with modern

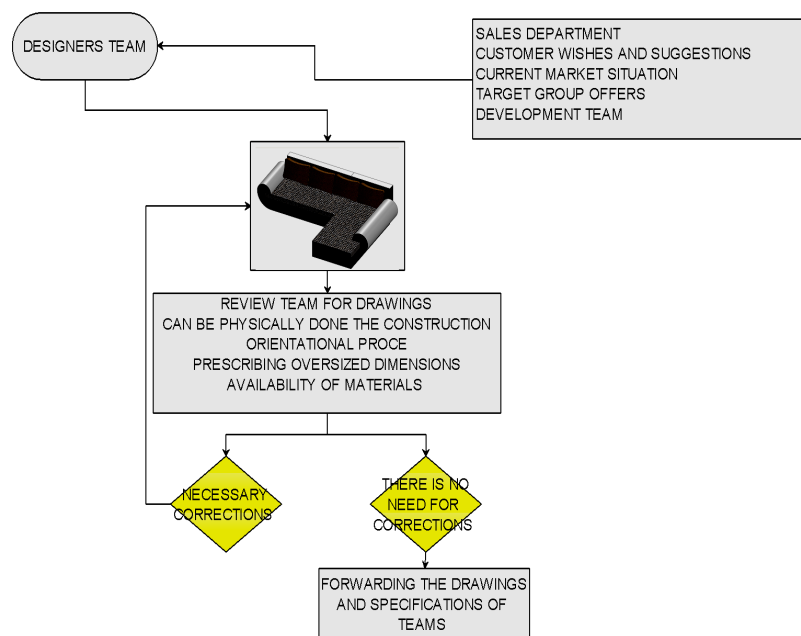


Figure 2. Algorithm initial stages of development [4]

consists of one member from each of the development team. They determine the approximate price, prescribing oversized dimensions, making allowance, in much the product can not be physically realized. Only when they agree and make a brief specification, sketch with basic information is shared by every development team.

## 3. THE STRUCTURE WORK OF DEVELOPMENT TEAMS

The structure of the development team consists experts from various fields. Mechanical engineers are dealing with the development of wooden structure, team upholstery is made of textile engineers, while for the sponge are combined teams in charge, textile and mechanical engineers. These are still teams for the procurement of materials, certification materials, if the material is first used, as well as teams for packaging and transport of finished products. Figure 3 shows the algorithm of functioning of the aforementioned teams, with correlated amongst each other. This interdependence product development, in the upholstered furniture industry, occurred as result of years of research and experience in this area and includes:

- ≡ Market research,
- ≡ Preparation of preliminary design sketches,
- ≡ Customize products price categories,
- ≡ Machine and operations which will realize the product,
- ≡ FEM analysis of wooden structures, in order to meet European standards regarding capacity,
- ≡ Packaging, labeling and transportation of products,
- ≡ Development of technical and other supporting documentation,
- ≡ Creating a zero-series and entry into serial production.

## 4. DEVELOPMENT OF WOODEN STRUCTURE

Development of wooden constructions is one of the most important stages in development. A well-crafted wooden structure must be suitable for installation, upholstery and, of course, must be realizable in serial production. Figure 4 shows the detailed pattern of development wooden constructions. Due to the volume of work has not been possible to show all the other stages of development. The development team who is engaged in elaborate wooden construction makes up to 5 people. Led by a team leader who manage the team and maintain communication with other teams. It is necessary to have good communication among teams to get to the end, when it comes to product assembly, which could easily be complete. Constructors wooden structures must pay special attention to the following items:

- ≡ The product must have a minimum load of 80 kg on an area of 0.5 m2.
- ≡ As small as possible total weight of the set (82% of the mass is the mass of wooden structures)
- ≡ Set must be flexible (according to customer left or right)
- ≡ Coupling elements (klamer, screws, hooks) must not protrude from the tree,
- ≡ In collaboration with a team that deals with materials prescribe adequate protection of wood,
- ≡ Using some other materials, mainly plastics, where this is possible.

All this means that teams can not work independently of one another, there is a maximum and constant communication and conditioning from the early beginning of the work in one team, finishing second operation and exchange of information. In addition, the design ideas are not totally free, open, although it may seem so from the outside, but there are conditioned entry requirements, formed on the basis of customers' wishes (flexibility, choice of materials, the use of lighter materials, price, the age of customers .....).

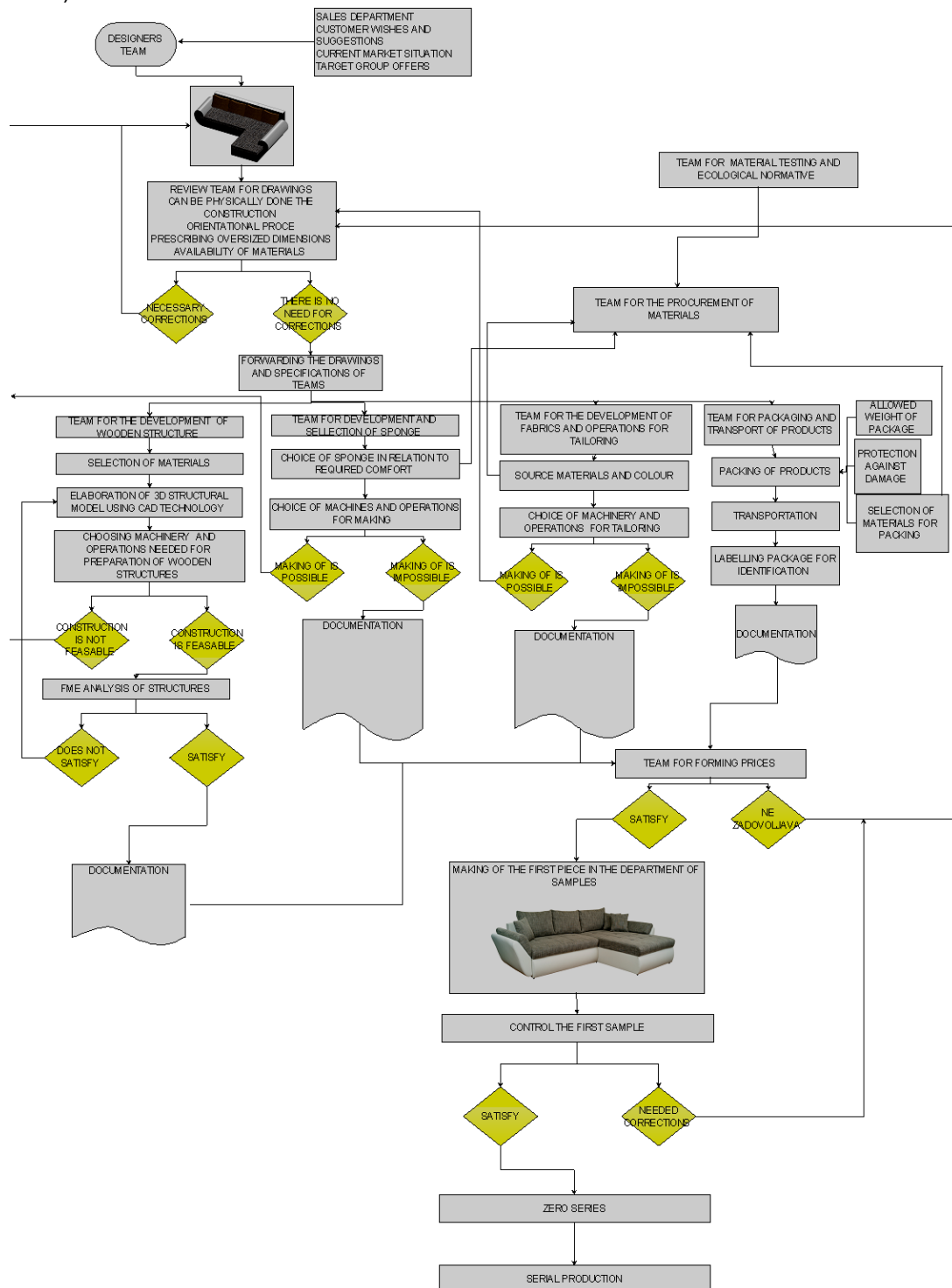


Figure 3. Schematic representation of activities and communications teams for new product development in upholstered furniture industry [4]

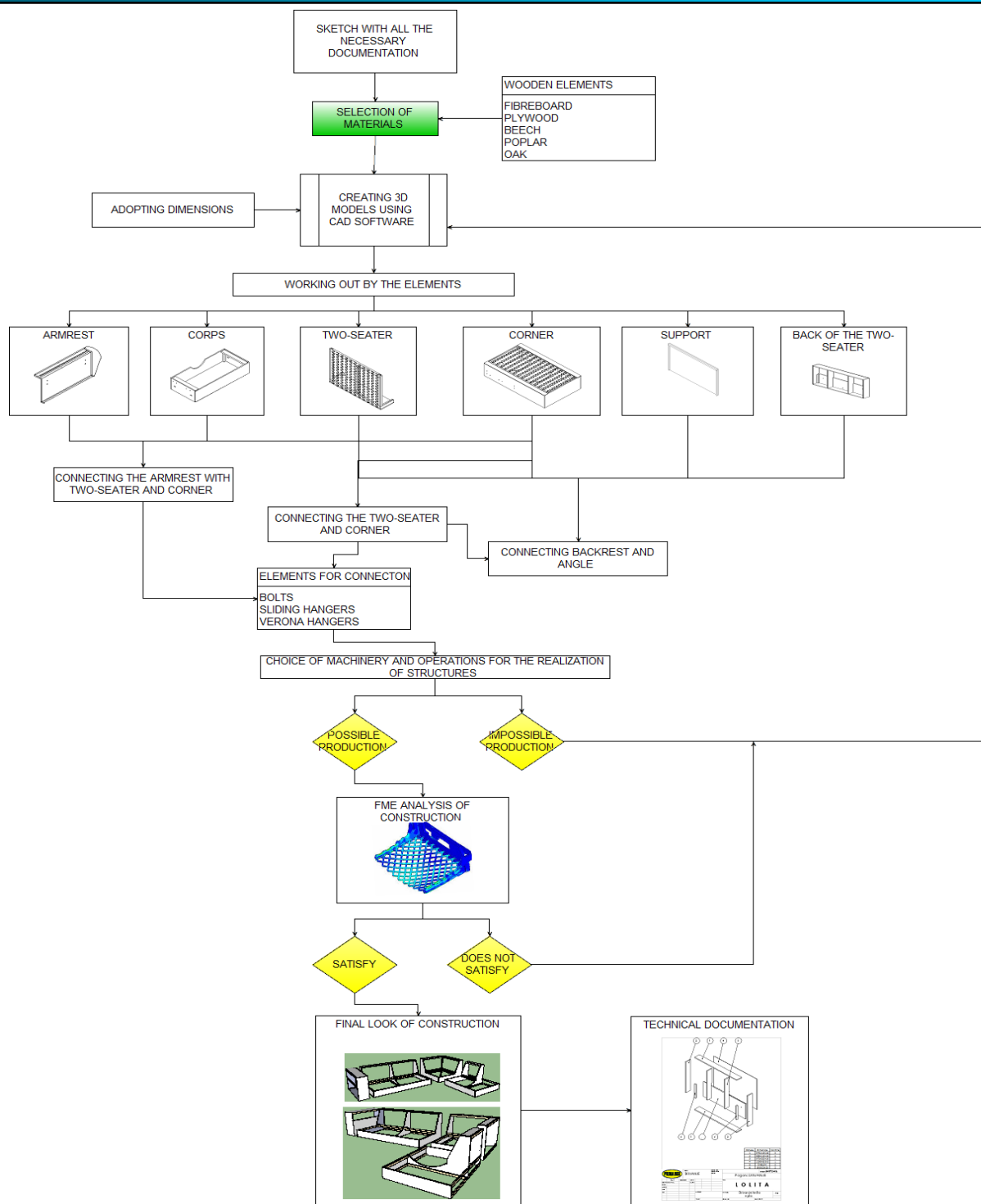


Figure 4. Schematic representation of the structure for the development of wooden construction [4]

## 5. UNIFICATION OF THE TOTAL PRODUCT

When all phases of product development are realized, next approach is preparation of technical documentation. Each team operates separately the documentation, it must contain drawings, descriptions, specifications and so on. When the technical documentation is complete and final passes shall be forwarded to the department of samples, which accordingly is made the first piece, as can be seen in the diagram (Figure 3). Figure 5 shows the phase of unifying the product in a final whole.

After making the first pieces shall be made possible corrections in order to redress irregularities that were observed during the preparation of the first piece, and then the product should be released in the zero series. Zero series is primarily used to confirm a way of making the product prior for making a decision on the introduction of the product into production. In practice, it often happens that the Department of samples makes the first piece without any major difficulties, and later, in the zero series, it turns out that some operations are too demanding or time-consuming. Thus, the zero set is used for adjustment of the product serial production, in order to correct the identified deficiencies and to prepare the product for mass production.

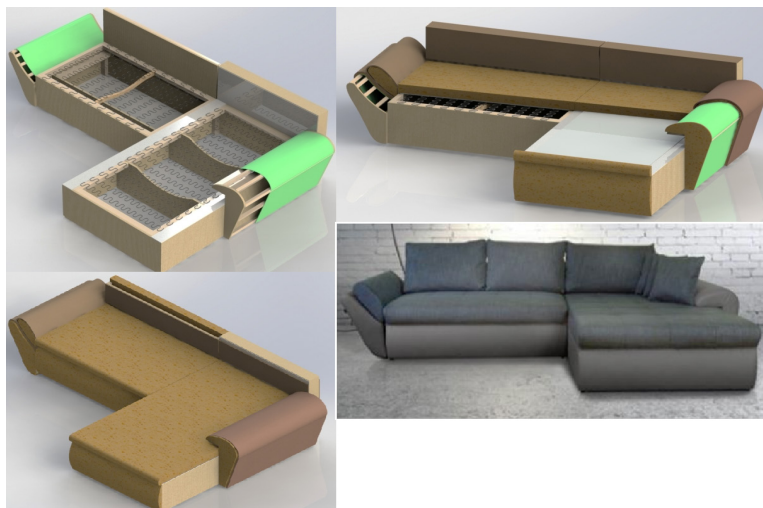


Figure 5. Unification of the total product

The next step is assembly-disassembly, packaging, labeling and transportation of the finished product. Installation and removal must be simple, ie the manual guide to mount the the product should be simple and easy, allowing the customer independently mounting. The packaging must be well designed how the product will not be damaged during transportation, also each package must be marked with the unique identification number, as the product would not have come to the wrong place (incorrect loading, the possibility that the product losses in the stock of finished goods, etc.). Also, because of the specificity of the materials used for making furniture, possibility of physical

damage, material sensitivity to external influences (heat, humidity, dust, ...), the method of packaging, labeling, instructions for transport, the markings on the packaging also represent the specificity of this type of product. Figure 6 shows the scheme for packaging and identification of the final product.

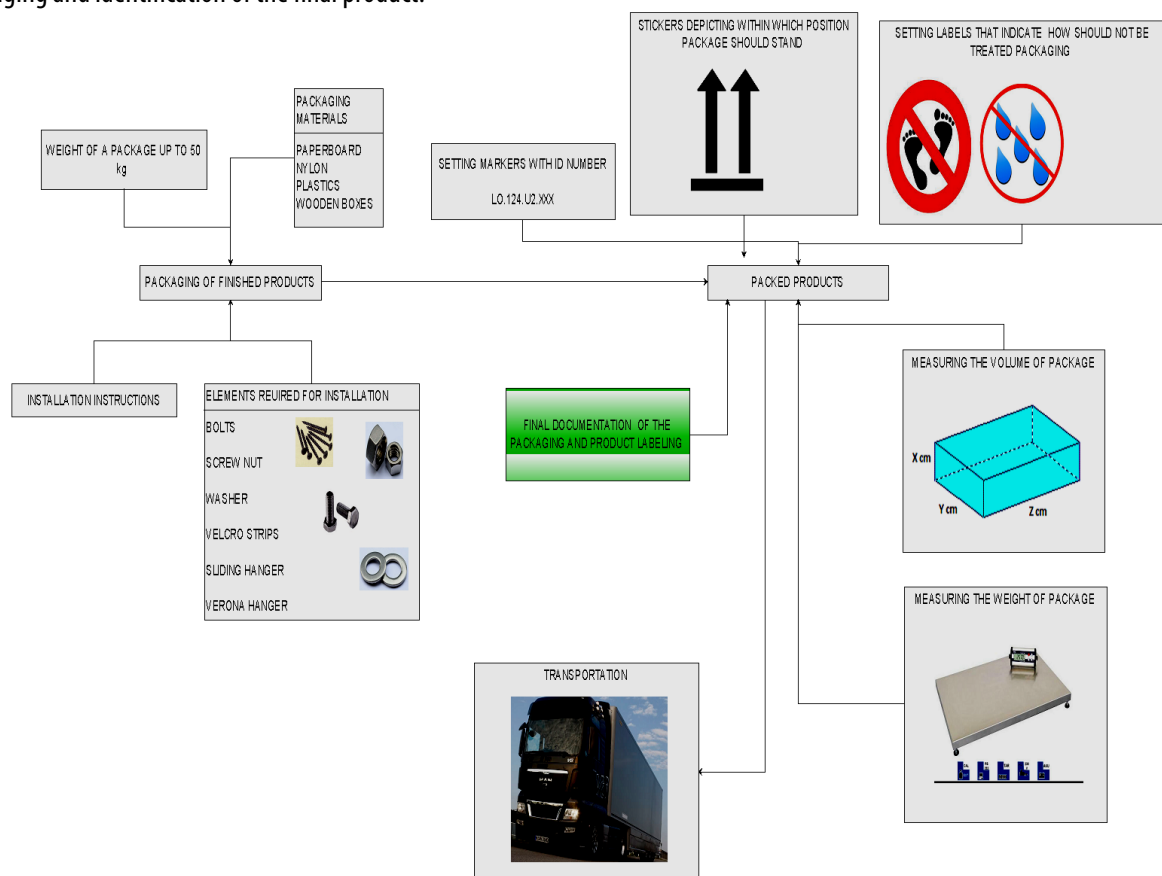


Figure 6. Scheme for packaging and identification of the finished product

## 6. CONCLUSIONS

Product development in the upholstered furniture industry takes place through all stages of development, similar to the engineering industry. The specialty product development in this area is the design of the product, which is very intense, because all phases are taking place in a very short period of time, and the possibility of errors must be kept to a minimum. Also, the specificity is reflected in the way of teamwork, through the formation of highly specialized teams, but also a way of forming a team for verification sketches, with representatives from all teams participating in the development. The biggest problems arise in the communication between the teams' rivalry", as well as defining the responsibilities of its members and the entire team, which is largely solved by forming algorithm shown in figure 3. The development of upholstered furniture industry lies in the standardization of certain operations and elements, which would, in this particular case, it might apply to the following activities:

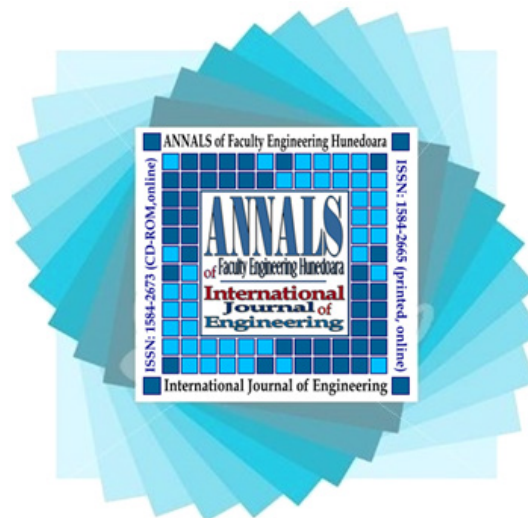


- ≡ Establish three product groups according to size (small, medium and large),
- ≡ Standardize cross-sectional dimension in the construction of a wooden frame (currently used by over ten different dimensions of the cross section)
- ≡ Standardize the packaging for packing (currently being drafted for each product special packaging)
- ≡ Use a bar code reader, to facilitate the traceability of the product.

Using the above recommendations enables acceleration development process and facilitating teamwork. It is evident that there is room for improvement in the process of developing a new product on the market upholstered furniture, which is shown to the recommendations. In order to obtain adequate information, it is necessary to conduct market research, taking into account current trends in furniture design, changing daily, which will be the subject of future research in this area.

#### REFERENCES

- [1.] Ognjanović, M. (2008). Design and Product Development, Faculty of Mechanical Engineering Belgrade.
- [2.] Cvetković, D. (2011). Design and Product Development, University Singidunum.
- [3.] Markovic B., (2008). The methodological approach to the management of human resources in the process of developing a new product, dissertation, Faculty of Mechanical Engineering, University of Nis.
- [4.] The company "Prima ISG" Internal documentation (procedures QMS), Gradiska, RS.



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