

## VALUE IMPROVEMENT APPROACH TO MANUFACTURING OF INDUSTRIAL FLAT MESHES (VE CASE STUDY)

**ARIELLA JANKA TARJANI & ISTVAN TARJANI**

The significance of this topic

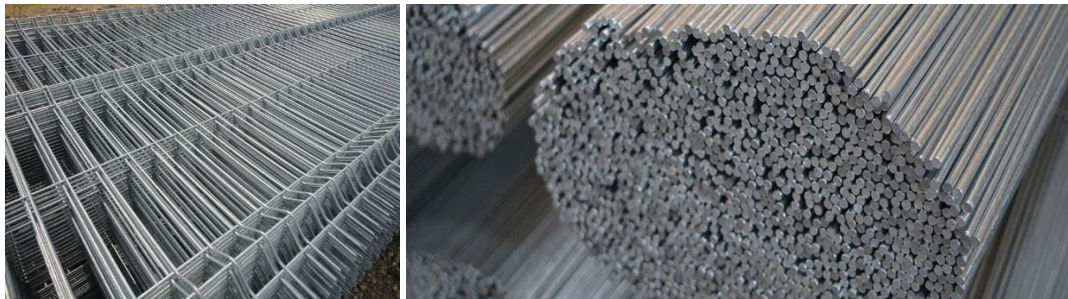
The company of Hungarian owners was established in 1995 with the purpose of implementing the retail activities of metal ware fittings and heating equipment. The commercial activity of the company has been extended by time, the company has also started to deal with the retail of hollow sections, angle steels, flat irons, welded flat meshes, fence element system.

The market demands that the individual products be either procured or produced by the company. Through its wholesale activity, the company has clients of good reputation that operate in the market in a stable manner.

The identified development opportunities are the following: Satisfying the demands of the buyers with products produced by the company, the continuous development of the technology with ensuring a high level of quality.

The topic

Value Improvement of the manufacturing technology of industrial flat meshes.



**Figure 1.: The product and its raw material**

Advantages of the concept

- Extension of the activity scope.
- Increasing the sales revenue and the profit.
- Development an optimized production technology.
- The flow of materials may be optimized.
- Satisfying the manufacturing capacity demand can be solved.
- The optimal space exploitation of the building can be realized.
- It is possible to achieve a fast service providing reacting capability.

Disadvantages of the concept

- It requires a new building.
- It is necessary to prepare the plans for the building permit. The permit obtaining process has to be successfully conducted.
- High investment costs will occur.

## Introduction of the background

The industrial site is located in the second largest city of Hungary, at a distance of 240 km from Budapest. It has a close relationship with the Romanian, Moldavian, Slovakian and Ukrainian building industrial companies, in addition to the Hungarian markets.

An empty real estate of appropriate size and the preliminary permits were already available for the erecting a newly built plant hall. There was an offer available from a machine manufacturer for the development of a unique flat mesh production line.

## Project objectives

### Main target

- Application of competitive innovative solutions
- Preparation of the technological documentation (1 documentation)

### Partial targets

- Examination of the process map variants that had been adjusted to the plant layout of point welded flat mesh production (target parameter: material flow route with taking into consideration the functions operating).
- Dimensioning and establishing the workplaces (target parameter: preparing the plant layout block diagram with taking into consideration the machine book parameters)
- Defining the placement of the objects of work. (setting the theoretical basis)
- Optimizing the technology with the method of value engineering. (target parameter: demand assessment, FAST function model, list of ideas, and incorporating their elements into the technology plan.)

## The selected method

### Value Methodology

## Present status

Since the company did not have a production hall of appropriate size and a production capacity that is suitable for producing the new products, the value engineering team considered the existence of the planned concept to be the current status.

The team used buyer questionnaires for fully assessing the demands. Altogether 9 different identified stakeholders were asked. During the work the team named stipulations and standards concerning 5 topic groups for the stakeholders, as e.g. the ISO process controlling, standards, etc.

In addition to this, the characteristics of the domestic market was also explored: Offer market, minimal reseller network – it is 1-2 % of the production capacity, with a user network that is quite wide. Among others the following may be buyers

- Container manufacturers. Product element: container mesh.
- Iron worker workshops. Products: fences, protective barriers, protective grids for windows.
- Machine industry. Product element: protective mesh welded into a frame, next to different machine lines.
- Building industrial wholesalers. The activity: selling in large volumes.

## Characteristics of the markets abroad

- Slovakian partner, who supplies raw materials and who may be the seller of the products with an exclusive right.

- Romania and Moldavia: production of fence elements, large market size.
- West European market: there is a big interest for gravel grids.

Based on the buyer demands and stipulations it was possible to implement the functional evaluation of the plan concept with taking into consideration the accurate description of the desired status. Based on the decision of the team, the list of requirements was compiled from the documents and the stipulations. The purpose of this was to allocate accurate and standardized parameters to the technological elements. In addition to this, the expectations that have to be met by the technology were phrased accurately.

#### Dilemmas

- What efficient technology should be deployed for producing the market worthy product, in view of the world class level production options, the resources of the company, the demands of the buyers and the standard stipulations?
- What plant hall should be erected for the efficient technology?
- Where should be the limit of the scope of value engineering be drawn? (building – technology, or both)
- In the case of a company of small staff (SME) what team should be set up and how should the team work? May the VE project be successful even in the case of a company that has a small staff?

#### Areas to be examined

- exploration of the risks (accident prevention, scrap creation, etc.)
- development of the commercial activity
- establishing the production technology

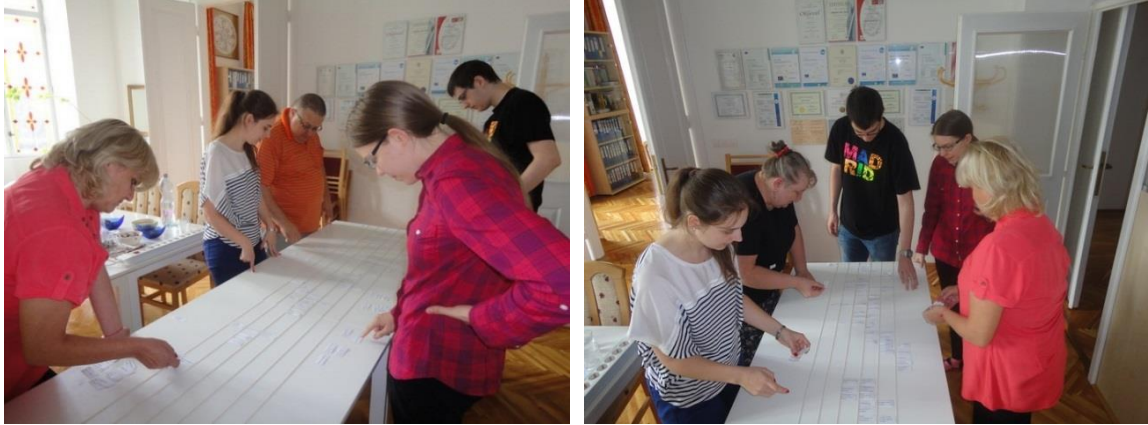
#### Function examination

The team examined 10 functions in the course of function analysis.

The team established the following main findings in the course of examining the functions and the function parameters:

- In the interest of sustaining continuous material flow
  - gravitation based solutions have to be applied,
  - the length of the routes of material movement have to be reduced during production with an automatic production line type of arrangement,
  - material moving auxiliary devices (e.g. roller ways) have to be used,
  - the products have to be protected from damages (damage prevention)
- The operation risks have to be analyzed.
- It is necessary to exactly know the technical requirements for establishing the technology.

The team decided that the functional appropriateness of the plan concept has to be examined.



**Figure 2.:** The team implemented the arrangement of the functions.

In the knowledge of the planned implementation of the functions, the team concluded that special attention has to be paid in the course of designing the technology to defining the risks and to avoiding the occurrence of the risks. For this reason, the team, with the agreement of the owner, decided to define and select the applicable risk aspects.

<b>Risk aspects</b>	<b>Weighting factors</b>	<b>Contents</b>
Worker	3	Worker, training, interoperability, sick leaves
Technology	2	Waste, shutdown, machine failure
Conditions	4	Items provided (machine, energy, information, material)
Business model	4	Seasonality, production by the deadline, sales, production for stock, order recalls
Production software	3	Internet, plus connecting 2 machines
Risk of accidents	5	Ergonomics, conditions of work
Quality	2	Audit, factory certificate, scrap
Forwarding	2	Fixing the freight, movement of the freight within the plant

**Table 1.:** Risk aspects

The weighting of the evaluation level of functional analysis was prepared on the basis of the risk aspects and the functional analysis level.

The team examined also separately those functions that had been marked as being risky.

The weak points that were marked for analysis from the aspect of risks are the following:

F122 Protect Humans

F2 Implement Commercial Activities

Weak points as regards the extent of function performance:

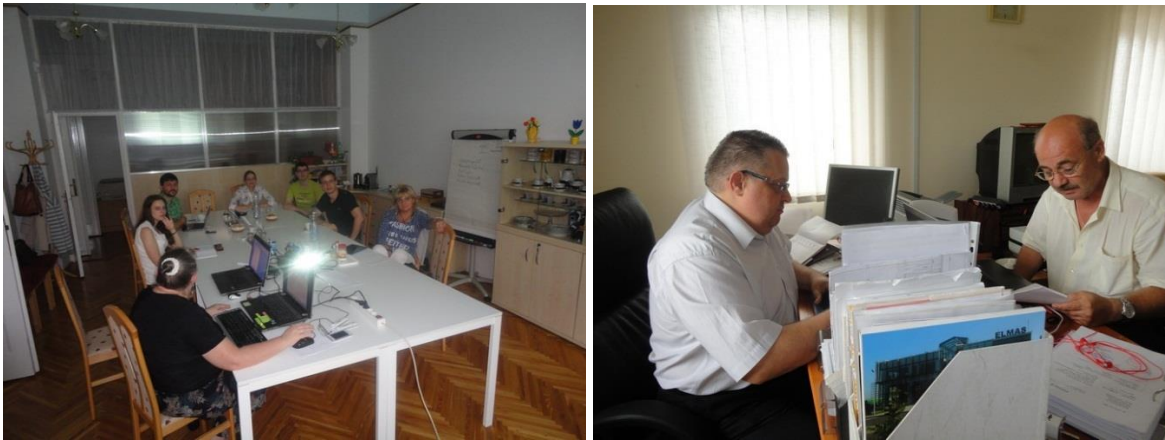
F112 Sustain Flow of Material

F121 Observe Technology Stipulation

New solution, new bases

The team collected altogether 236 ideas.

The underperformed functions were defined based on the evaluation of the functions. The ideas collected for the functions placed the concept on new bases.



**Figure 3.: The team working. Evaluation of the results with the participation of the owner.**

## Results

Proposals prepared by the team:

- technology description
- plant layout drawing
- material flow plan
- workplace dimensioning
- placement of the objects of work
- risk analysis.

Value increase based on the analysis of the functions



**Figure 4.: A solution of accident prevention, surrounding a winding (Function: Prevent Accident)**





**Figure 5.: Point welding of an approved construction (Function: Bind Elements)**



**Figure 6.: Stacking (Function: Sustain Flow of Material)**



**Figure 7.: Method of placing the products upon each other (Function: Prepare Packaging Unit)**



**Figure 8.: Packing the product for transport (Function: Protect Product)**

Important conclusions:

1./ It pays off, if we do not skip ideas

The team collected the ideas and the objectives into the following table:

Targets	Preparing the technology documentation Optimizing the technology with the method of value engineering	Examination of the process map variants adjusted to the layout of the plant that produces point welded flat meshes.	Dimensioning and designing the workplaces	Defining the placement of the objects of work
Ideas				
Training				
Material movement		x	x	
Accident prevention	x	x	x	x
Visualisation	x	x		
Technology	x	x	x	x
Motivation				
Market, marketing				
Business model				

**Table 2.: Ideas and objectives**

It may be concluded from the above that the ideas that concern training, market-marketing and the business model are not connected to the targets set. Therefore, they were not elaborated on topic sheets. The team did not drop any idea, it even kept an idea that was outside the topic scope in view of the fact that it has a strategic significance in the case of a 2-person enterprise.

2./ It is possible, and it is also worthwhile to carry out a VE project at a 2-person enterprise as well.

The company announced and offered the possibility of joining the team to Hungarian AVS experts, university engineer and economist students. The team was set up from the appropriate experts.

3./ Importance of risk analysis

In the course of analyzing the products and the technology we do often and easily forget to examine the risks, in spite of the fact that this is an indispensable step.