

A detailed image of a turbocharger, showing its complex internal and external components, including the turbine and compressor wheels.

# CASE STUDY «TURBO SERVIS»

## TURBOCHARGERS, VENTILATORS, WATER PUMPS, INTERCOOLERS

*"Continuous improvement of processes enables us to withhold the leading position in the market and to save and get the confidence of potential customer"*

*General manager, Nikodin Veljović*



The UNIDO Automotive Supplier Development Programme in Serbia was carried out in collaboration with the Auto-Cluster Slovenia (ACS), with the objective to assist suppliers/vendors to OEMs and Tier-1 suppliers to raise their productivity and quality standards, so as to become more competitive on the market place.

After having carried out an initial assessment survey of 27 local component supplier companies in 2007/2008, 11 firms were selected to take part in the counseling activities with the aim of improving their overall competitiveness and, therefore, help them to integrate successfully into national and international supply chains. A specific methodology was developed in partnership with AC Slovenia to assist those selected companies in reaching this objective. The present case study describes the upgrading approach that has been applied in the company “TURBO SERVIS” and highlights the results achieved through this programme.



## Overview

**Location:** Uzice, Serbia

**Manufacturing activity:** Turbochargers, ventilators, water pumps, intercoolers

**Number of employees:** 45

**Average annual turnover:** €1.1 mio

**% of goods exported:** 30%

**Programme period:** IX 2008 – IX 2009

## Background

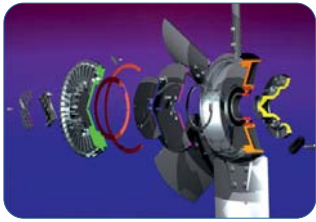
TURBO SERVICE was founded on Christmas Day (7 January) in the year 1984, by the owner Mr. Veljovic Nikodin with great optimism and a modest initial capital (16m<sup>2</sup> of space and one employee, with a minimum of equipment). In April 1988, a workshop was constructed with 250m<sup>2</sup> of space, new equipment and 5 additional employees.

With the construction of a commercial building complex in 2001, the company started to produce on larger scale in an attractive location, which offered 1,600m<sup>2</sup> of office space. Additional workers were hired to serve the increased production capacity.

Today, Turbo Servis is the leader in sales and repair of turbochargers, visco-fans, visco-clutches and water pumps on the Serbian market as well as in the Central, South and Eastern European region. Its product range also offers intercoolers, radiators, thermostats, compressors, and other air conditioning and cooling parts for passenger, commercial vehicles and trucks.

With more than 20 years of experience and 45 long-standing employees, the company has gained a reputation for engineering excellence. Turbo Servis maintains its quality standards through numerous distributor agreements with the world's leaders in the design and manufacturing of turbochargers and visco-fans that include Garrett, BorgWarner – KKK, Schwitzer, Holset, Behr Hella, as well as a large number users of the firms services and products.





## The Challenge

In 2007, when UNIDO experts carried out an assessment of the company, they noted the ambitious commitment of Turbo Servis' managers on all levels to business improvement. Top management has shown a very good sense of private business and entrepreneurial thinking/mind-set.

Nevertheless, the company was still facing a series of challenges, which were difficult to deal with. The upgrading programme offered by UNIDO through the Serbian Automotive Cluster was identified as suitable to address those issues.

The main problems and challenges the company was facing at the start of the programme included:

- **Low productivity** as a result of poor work organization, unorganized shelves of finished products and raw materials and inadequate disposal of waste, and accumulation of intermediate products and tools in the shop floor.
- **A large number of customer complaints** (returns of products and services, long waiting times, etc.) as a result of poor client orientation and staff morale, and un-organized production and service processes.

Monitoring parameters for the production and service sections were set at the lowest levels and no analysis was performed.

## The Goal

Achieve an overall improvement of company's performance to strengthen its capability to deal with the challenges faced in Serbia as well as on foreign markets.

## The UNIDO Programme / Process and Tools Applied

Counselling activities in "TURBO SERVIS" started on 18 October 2008 under the guidance of Ms. Maja Pesic Rakanovic (UNIDO national expert).

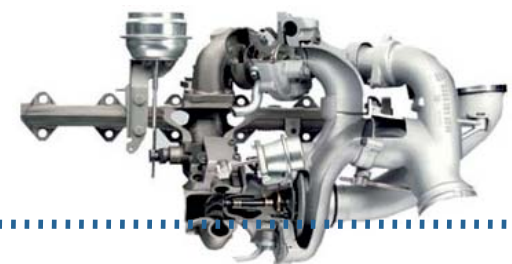
During the first visit to the firm, a short production and business process audit was carried out, based on which a work plan with planned activities was suggested, and adopted. This plan was formally approved by the managing director of "TURBO SERVIS", Mr Nikodin Veljovic, who showed great commitment to the programme.

As a follow-up, the counselor visited the company on a monthly basis between October 2008 and September 2009 to advise the team of "TURBO SERVIS" on necessary action to be taken in order to realize their vision and work plan. These visits focused on the previously carried out analysis and the steps marked in the action plan. In this context, the counselors assisted teams of appointed employees in finding the right methods and places for improvement within their spheres of influence.



At the same time, **training sessions and workshops** were held on following topics:

- Formation of "mini groups" (small teams of selected employees working on a specific theme/issue) in the company, functionality and selection of their leaders
- Concept of Continuous Improvement
- Key performance indicators to track progress of improvements
- 5S workplace management
- Visualization (tables, goals, photos, process flowcharts, process indicators, location for defect products, waste storage...)
- Award schemes for improvement suggestions brought forward by employees
- Achieving operational cost savings and productivity increases



## The UNIDO Programme / Process and Tools Applied

Already in October 2008, “TURBO SERVIS” was assisted in establishing **key performance indicators** to track progress of improvements, including, amongst others, the following:

- Scrap Yard Area and scrap Clearing Frequency
- Percentage of Employee Involvement
- Number of Accidents
- Absenteeism
- Defects due to machines
- Accidents due to machines
- Customer complaints
- Customer returns - PPM
- In process rejections - PPM
- On time deliveries
- Productivity
- Training days per year per employee
- Water consumption
- Energy consumption



These indicators were reviewed periodically during the counselor's visits, and measures for improvement were discussed with the teams based on the observed results.

Within the framework of the action plan, one of the first tasks for all 7 teams (“mini groups”) formed in the company was to initiate activities to **better organize the workplace** according to the Japanese **5S concept**, starting with the steps “**1Sort**”, “**2Set in order**” and “**3Shine**”. After having identified all items that were not directly relevant for the work to be performed in the target work station, the teams started to arrange the space by removing the identified items and cleaning the places and equipment. In this process, the warehouse and the entrance area were tidied up and re-designed to become more appealing to visiting customers. The next step to be taken under the 5S concept, it called “**4Standardize**”, which was still in progress in the company at the time this case study was written. This step focuses on determining the right places to arrange tools and equipment once the workspace is clean and all unneeded items are removed. Each place is marked (visualization) so that it is clear to all workers which tools belong where for easy retrieval. In order to maintain the results achieved by the teams and keep improvement activities alive, a set of standards for order and cleanliness were set (“**5Sustain**”). Each team prepared special sign-boards, which displayed to everyone the agreed work plans, standards, handling instructions and responsibilities, production results, as well as the progress achieved in the improvement cycle by each group.

**Employee motivation** was one of the crucial issues management had to deal with. At beginning of the counselling activities workers were suspicious and a bit hesitant, particular because 3threewomen took the lead in all activities - Ms. Marijana Veljović and Ms. Marija Čatić as TurboServis focal points and Ms. Maja Pešić Rakanović as UNIDO counsellor. This is not frequently seen in an industry that is still primarily dominated by male workforce. Also Turbo Servis employed only men in the service and production departments. Through great efforts from the side of the female team leaders, a series of informal conversations with the workers and continuous presence in production and service sites, the initial skepticism slowly disappeared.

All employees received information and explanations on the various issues to be dealt with during the team meetings, and were encouraged to provide suggestions for improvement. Guidelines on how to achieve those improvements were developed jointly and so-called “**improvement boards**”, indicating the suggestions made as well as the conditions before and afterwards, prepared.





## Results and Achievements

Despite of the impact of the global economic crisis in 2008/09, significant improvements have been reached by the teams in “TURBO SERVIS” already at the beginning of the counseling period – particularly in the field of re-arranging the production and storage areas, as well as the space available around the factory to **enhance productivity and efficiency of operations**. This was achieved by reducing the surplus of raw materials, and writing off products, machines, tools and equipment, which was not functioning properly. Parts of the surplus materials and equipment were sold; the rest was moved to a storage area which was set up in a special zone on the premises.

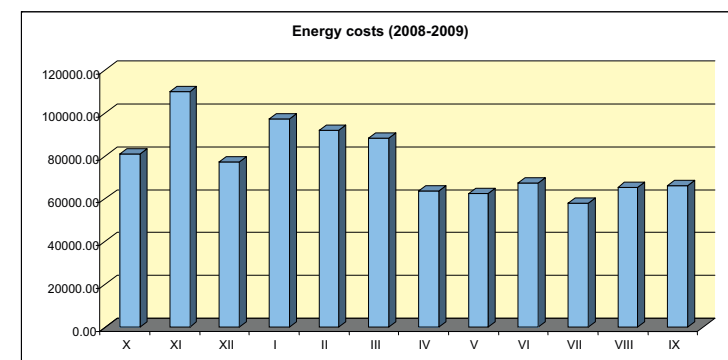
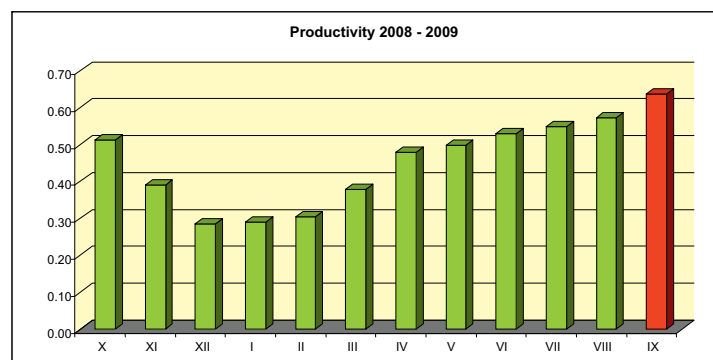
A large number of suggestions for improvement were provided by employees – they have shown great commitment and accepted the introduced system of continuous improvement very well. The programme was also positively received by workers as an opportunity to increase their status, raise their salary, or earn rewards. Special emphasis was placed on ensuring that all employees could be kept on board during 2009, the year of a global economic crisis. Furthermore, management implemented as **pilot award scheme for the best employee of month**. He or she was entitled to a 5-10% of salary increase. Criteria for receiving this award included: employee productivity, absenteeism, results of the employee survey (# of complaints by other workers), and sticking to work instructions, results of a customer survey (# complaints or praises by clients). Employees also provided suggestions for such awards, which paid weekend trips for the family of the best worker of the month, and some additional free days.

With the support of the counselor, employees came up with suggestions and solutions for problems that complicated and slowed down their work (e.g. marking the parts that come into the next production operation, storage of final parts on shelves, etc.). Proposals for the introduction of new services using existing equipment and minimal investment were also provided by employees themselves. The management of “TURBO SERVIS” received **25 proposals for improvement** from its 30 production workers. 10 proposals were adopted and implemented, such as e.g. marking (identification) of parts that come to the production operation, placement of finished and identified parts on separate storage shelves - not on work place, and proposals for new products to be developed.

The company furthermore established **better control and analysis** of all segments of production and service, and in that way, was able to **reduce the number of customer complaints**.

A monthly analysis of all business processes helped to identify problem areas and solve them quickly. At the beginning of the counseling activities “TURBO SERVIS” established **key performance indicators** for process monitoring and measurement. The “owners” of the processes (i.e. chief of production, chief of service, chief of purchasing, etc.) were trained on how to monitor and measure the defined key indicators by the quality management representative (Ms. Marija Catic). For each key indicator, a target was defined. At the beginning of every month, process owners had to report to the quality management representative about results achieved in comparison to the previous month. After having jointly analyzed the results, improvement actions were initiated or corrective action for the respective indicators defined.

Through the 5s activities - the proper arrangement of work places - the movement of employees between operations was kept to a minimum and thereby **enhancing their productivity**. Throughout the programme, “TURBO SERVIS” was able to increase its productivity from **0,5119** (units produced per employee per hour) in September 2008 to **0,6372** in September 2009. The movement of material could also be reduced through the actions taken in the course of the UNIDO counseling programme, which led to a **reduction in production costs**.



Increases in productivity were also result a result of **the increase of capacity utilization**, which rose from 70% to 90% during the programme.

Since clients were mainly complaining about the time needed for repairs, enhanced productivity also directly **reduced the number of customer complaints** – they reduced from 4 objections per month in September 2008, to only one per month the year after. Furthermore, “TURBO SERVIS” experienced a significant **decrease in customer returns**: from 79 (September 2008) to 11 (September 2008).

The storage area was rearranged and set in order by classifying all products in groups and containers, which resulted in **additional free space of 40 m<sup>2</sup>** in the storage area. New parking space was made available for the clients.

Through better organization of the machines, schedules of operation, cleaning and workplace arrangements, “TURBO SERVIS” also managed to **reduce the number of accidents** from 10 to 0 between September 2008 and September 2009. Previously, most of the accidents happened when workers were searching for tools or equipment during the production operation. Even though the injuries were generally not of a serious nature and did not result in long sick leaves, they had an influence on the motivation, speed and productivity of the workers. After better organization of work place (everything was on its place, no unnecessary items lying around on the shop floor, no scrap scattered on the floor), the number of accidents come down on zero as there was no more need to search for any tools (each tool that was needed for the process had its clearly marked/indicated place and could be easily retrieved).

**Employee satisfaction has increased** because the working environment has become cleaner, safer and more enjoyable. By improving its organization and layout there was relief of certain work activities (better ergonomics), which increased the overall morale. As a result, the **absenteeism rate was reduced** from 9.27% in 2008 to 3.71% in 2009.

The improvement activities undertaken also resulted in a **decrease of costs for water consumption** from €53.37 per month in 2008 to €37.15 per month in 2009, and as well as for **energy consumption** from €941.86 per month in 2008 to €694.74 per month in 2009 (although the energy prices in Serbia saw an overall increase for 20% in that very same period!). This was achieved through an optimization of the production flow process – all machines in the mechanical workshop were placed in a way so that one operation directly followed the next one in a harmonized sequence. Before, workers had to 'wait' for the next operation and non-loaded machines were running, using water for cooling and energy without generating any outputs. Furthermore, the elimination of unnecessary storage space for semifinal products in work area decreased the time required to move semifinal products from one operation to another and enabled faster moving of raw materials and parts.

The daily briefing meetings held within the project teams and the regular information gatherings with employees **enhanced the cooperation between the various departments** in “TURBO SERVIS” (in the case of receiving notice or triggering faster response), and also contributed to enhancing the motivation and productivity of workers.

All these **improvements and savings enabled the company to purchase new equipment**, including a machine for balancing, a device for testing as well as a new information system, and set the ground for the development and production of **170 new products**. This shows the great contribution of continuous improvement activities to the business development of “TURBO SERVIS”.

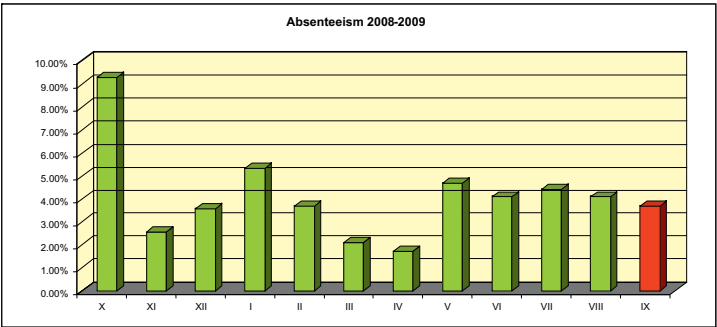


Figure xx: Number of customer complaints:

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2008	52	81	88	94	77	99	83	87	79	36	41	33
2009	30	49	26	54	39	46	30	34	11			
%	-42	-39	-70	-42	-49	-53	-64	-61	-86,08			

Area	IX 2008	IX 2009	Improvement
Percentage of Employee Involvement in 5S: 5S (1S/2S)	0%	100%	100%
Scrap Yard Area (u m2)	100	80 m <sup>2</sup>	- 20 m <sup>2</sup>
Absenteeism (%)	8,3	3,71	- 4.59
Documented Kaizen (%)	0	25	+ 25
Customer complaints	79	11	- 88
On time delivery	93,26%	97,47%	+ 4,21
Productivity	0,3902	0,6372	+ 0,247
Consumption of water	4.751,80	3.531,71	- 25%
Consumption of energy	81.040,80	66.000,02	- 18,6%
Number of new products	50	170	+ 120
Number of training days per employee	2	19	

## Area

### TURBO SERVIS Courtyard

#### Before



#### After



## The Way Forward

The next steps in the implementation and maintenance of the established systems and procedures in “TURBO SERVIS” are to transfer the good experiences achieved by the project teams to the entire company (additional sections and departments), and to establish a company-wide system (standards).

The top-level management of “TURBO SERVIS” also recognized the value of the activities carried out through the UNIDO programme as a great help for the company in the process of achieving higher productivity.

The company now also plans to introduce the just in time, total productive maintenance, and total quality management systems

.Specific objectives to reach over the following 12 months include the following:

- Introduction of better internal control systems and production monitoring in order to further reduce the number of complaints to zero
- Further improving motivation and organizational skills of employees by increasing training days per employee to a minimum 20 days training.
- Improvement of technological processes

*Nikodije Veljović - Executive manager:*

*"We will continue with improvement of all business processes and try to become more competitive on domestic market"*



# CASE STUDY

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WATER PUMPS, INTERCOOLERS**



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