

TOOLS FOR THE »RESOURCE VALUE STREAM MAP«

Software support to visualize and improve
resource consumptions

IN COOPERATION WITH

**SENAI –
SERVIÇO NACIONAL DE
APRENDIZAGEM
INDUSTRIAL**

TOOLS FOR THE »RESOURCE VALUE STREAM MAP«

Software support to visualize and improve
resource consumptions

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Content

1	Figures.....	5
2	Abbreviations.....	6
3	Introduction.....	7
4	Methodology.....	8
5	Results.....	11

1 Figures

Fig. 01: User interface of »REEF« tool.....	9
Fig. 02: Extract of process model.....	10

2 Abbreviations

e. g.	for example
IPT	Institute for Production Technology
KPI	Key performance indicators
RVSM	Resource Value Stream Map

3 Introduction

Since frame conditions regarding political regulations, climate change and the exploitation of natural resources are changing constantly in this day and age companies need to find a way to deal with those changes. Those external prices for energy as well as for other resources such as raw materials are increasing constantly at the same time. Companies can deal with that situation with the help of an intelligent use of their most important resources and save money and finite resource reservoirs likewise. Next to financial benefits, customers and other stakeholders will cherish »green« products. The Fraunhofer Institute of Production Technology IPT in Germany identified those needs at the right time and therefore developed both the »Resource Value Stream Map« (RVSM) and the software »REEF« (resource efficiency) to visualize, identify and analyze the most influential consumers of resources and the involved processes respectively operations and improve those in the consequence. Firstly, the method of the RVSM will be explained to illustrate the software's integral part within the application of the RVSM method. The software was already used in projects in the German as well as the Brazilian industry and led to significant resource savings as well as financial benefits. The following paragraph introduces into the overall method and then presents the software's part and its functionality. In the end, results of the practical application in pilot projects will be presented.

4 Methodology

The procedure of RVSM is based upon the classic Value Stream – solely extended by energy- and resource-related parameters – and thus divided into six steps:

- Definition of scope (1)
- Definition of relevant key performance indicators (KPI) (2)
- Identification of process steps (3)
- Analysis of process parameters (4)
- Identification of resource saving potentials (5)
- Derivation of improvement measures

While the RVSM covers the analysis of the whole process chain the »REEF« tool is involved into the steps (3) and (4) and supports with an easy-to-use visualization and the calculation of KPI created out of information gathered on the shop floor and inserted into the software. After the agreement about the starting and endpoint of the process chain analysis and the choice of resources to focus on an extensive shop floor visit needs to be conducted. That visit delivers information about single process steps within the entire process chain and induces the use of the »REEF« tool: as it is known of the Value Stream, single process steps can be visualized with individual process boxes to insert parameters. »REEF« enables to visualize and connect the whole chain via drag & drop which allows focusing on the relevant analysis due to a time-efficient mapping. After finishing the mapping the user can determine and specify particular parameters for each process step (number of machines, power consumption, material flow, consumption of compressed air) which are relevant for the calculation of KPI and the controlling of the results in the end as a part of the continuous improvement process. The software itself carries out the necessary calculations of KPI in the background and displays those in another field of the process box to preserve a well-arranged overview of the process chain as well as single processes and their specific parameters. The use itself is straightforward and intuitive – each process box can be selected and values inserted with the help of the easy user interface (Fig. 01).

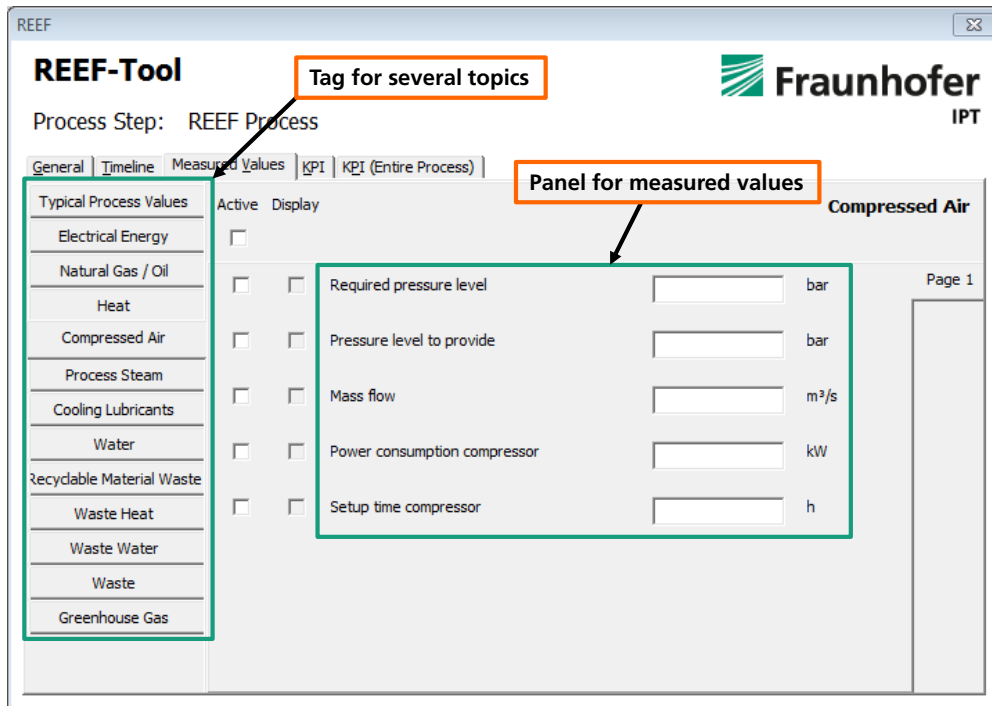
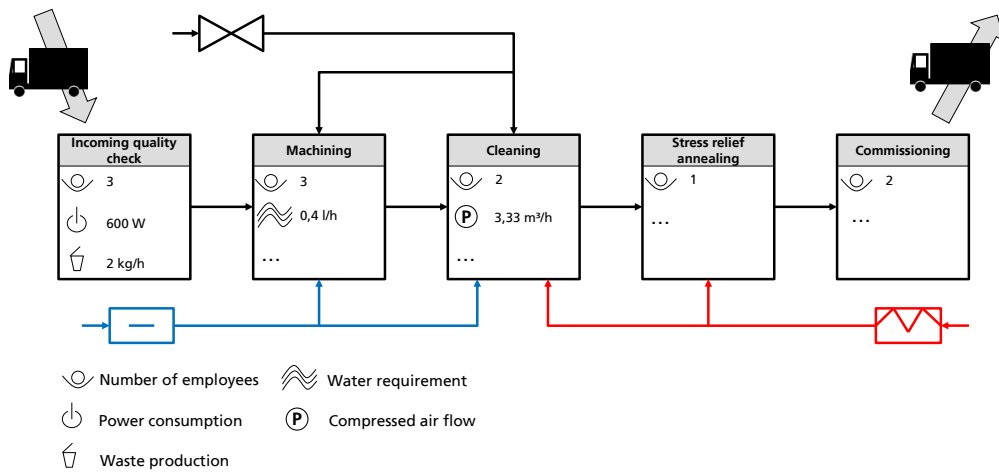


Fig. 01: User interface of »REEF« tool.

The user interface offers several options to adjust the mapped process chain. Comparable to the classic Value Stream Map »REEF« allows adding a timeline according to the process-related times and even creates it autonomously based upon the inserted information. The timeline supports in the identification of waiting and standby times to evaluate (non-)value adding time and reasonable stock sizes. Additionally, the comparison of processing times with state of the art-technology can lead to the discovery of gaps and thus improvements: the higher the gap, the higher the (theoretical) potential. Besides times, »REEF« supports the storage of information regarding actual load profiles (in terms of power consumption) and energy or material consumption. These includes next to electrical energy oil and gas (e. g. volume flow), process heat (thermal power, temperature level, length of pipes, dissipation), compressed air (volume flow, pressure level, compressor power) as well as information about water consumption or waste production (waste heat, waste water, cutoffs, greenhouse gas). If the user inserted all those or at least parts of those information into »REEF«, those values are used for the calculation of KPI. For clarity reasons several information and KPI can be hidden but remain in the background for further investigations. The structure of the user interface in this context is simple – several tags allow switching for example from measured values to KPI for the single processes as well as the entire process chain. Moreover, the tag »measured values« separates again different topic such as energy, compressed air or material.

Fig. 02 shows the extract of a process model leached of a gear box manufacturing process chain.



After finishing the mapping of the entire process chain and the insertion of all information, peripheral devices are added to the process chain – this includes water distribution, compressed air and process heat networks. Fig. 02 shows some parameters by which the RVSM was extended compared to the classic Value Stream.

5 Results

The application of the RVSM in combination with the »REEF« tool led to results in an automotive OEM in the field of

- Recuperation at cooling circuit and pre-heating of washing fluids
- Compressed air network
- Process organization such as Kanban for tools to reduce waiting times

Several other projects which were conducted by Fraunhofer IPT in the automotive as well as the aviation industry realized savings in additional fields: recuperation at compressors for example had an outcome of about 27.000 € cost reduction annually for a small company. That particular measure was implemented with low efforts both timewise and financially and therefore featured a short amortization time of approximately six months. Those results show that a structured approach combined with effort-reducing tools to focus onto the fundamental analysis instead of diligent but routine pieces of work are suitable to provide solutions for the reduction of costs and resources at the same time.