Life Cycle-Based Service Design for Innovative Business Models

H. Meier
Chair of Production Systems, Dept. of Mechanical Engineering
Ruhr-University Bochum, Germany
Submitted by W. Massberg (1), Dortmund, Germany

Abstract
A successful service business requires a new life cycle-based approach with a comprehensive view of the real customer's demands. This includes the establishment of innovative business models. These business models cover the fields of planning, finance, ramp up, revamping, take back as well as a guarantee for the availability to supply maintenance and repair. The latter can finally lead to the operation of the machine itself in a performance-contracting model. Business models will also offer an excellent way to develop ecological potentials while fulfilling economical constraints. This was the background for a research project to analyze the machine-oriented service development with the goal of standardization, rationalization, and automation of life cycle-oriented service processes. Therefore, a service configurator was developed for the efficient supply of customer-based services. The configurator will also consider the suppliers of the machine manufacturer. The results were evaluated in an industrial environment with the help of an innovative business model.

Keywords: Life Cycle Management, Maintenance, Service Engineering

1 INTRODUCTION

Means of production which are environmentally-compatible and save resources can hardly be enforced in global competition due to national laws. Thus creating a necessity to search for technological and economical potentials which increase the competitiveness and harmonize the ecology and economy in one target system. A successful economic use of production means, for example, over a longer period of time, will lead to a considerable saving of resources [1].

Research activities on life cycle-oriented product design have mainly been concentrated on the re-use of used components [2] and the development of re-configurable means of production [3,4]. These technical-oriented solutions, however, lack of methods for an integrated design of corresponding services. To adopt these methods under economical aspects in practice, suitable business models are required.

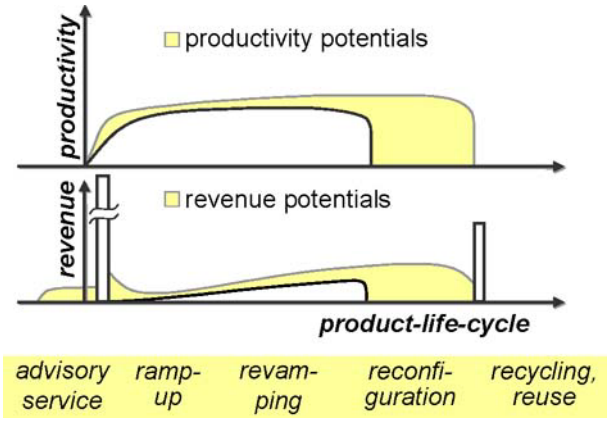

Figure 1: Life cycle based economic potentials.

The life cycle of a means of production offers a variety of approaches for innovative services which do not only increase its productivity, availability and efficiency for the customer but also the revenue of the supplier (Figure 1).

Providing services will not only reduce the distance between the customer and the supplier but will also offer the chance to recognize a change in the customer requirements and technological development potentials as early as possible. Thus increasing the competitiveness of the supplier to a large extend.

2 FUNDAMENTAL SERVICE DEMANDS

Customers in the capital goods industry expect more and more solutions in the form of process elements which can simply be integrated in or exchanged from their value-added chains. These elements should do without strict bonds or long-term obligations. The customer demands can be explained by the economic necessity to source out irrelevant added value processes, particularly as some industrial branches do no longer consider production as their core competence.

These customer demands and the decreasing possibilities of machine-oriented competition led to more service activities, even in the machine tool industry. This is enhanced by the rising complexity of highly automated production systems. New proceedings, methods and tools for the identification, development and supply of service products with the appropriate business models need to be developed on the supplier's side.

If a new life cycle-based product comprehension is to be established, the customer demands need to be analyzed first. Second, appropriate business models and company strategies for the supplier need to be developed and finally there is a need to re-design the internal working processes in a service-oriented way. The matrix shown in Figure 2 has been developed to classify operation fields. It is structured vertically according to strength and duration of the effect of the success into strategic, tactical and operational planning levels. The horizontal structure differentiates between activities for the production of goods and services (process dimension), the ability and willingness to produce goods and services (potential dimension) as well as the use of the customer (result dimension).

The result dimension defines the market segments and the corresponding business models on the strategic level.

It can be broken down into product families and modular service components on the tactical level. This serves as a basis for the customer-specific configuration on the operative level. To provide these services, the necessary service units have to be created, the members of staff need to be trained and cooperation partners need to be found for the completion of the offer in the potential dimension. The selection and implementation of a Service Management System (SMS) is part of the operative level of the potential dimension [5]. The process dimension includes the development of a service-compatible process organization, using an IT-supported Workflow-Management. The task of the operative level is the efficient coordination of service orders by a SMS enriched by Multimedia und Remote Technologies [6]. It is made clear that tools of the operative level, e.g. Remote Services alone cannot account for a successful service business. Only a company-wide service orientation based on the customer's needs will lead to an economical success.

dimension / planning level	result	potential	process
strategic	markets, business models	service units (staff, location)	process organization
tactical	product families, service modules	staff qualification, cooperation	workflow-management
operational	configuration	service-management system	data management, remote service

Figure 2: Operation fields for the development of service-oriented business models.

In the following we will focus more detailed on the result dimension, as it gives the decisive impulse for the change to a service-oriented company philosophy.

3 CUSTOMER-SPECIFIC SERVICES

One of the most important factors in the machine tool industry is the ability to offer dedicated machine tools. The question arises how these abilities can also be used in the service sector, without being lost in a large number of individual services. The supply of niche markets led to the same problems in the capital goods sector originally: an increase of design and production costs which was in no relation to the market – and result profits. Product modularization and configuration as part of the superior idea of mass customization were used to escape this misery [7].

Modularization- and configuration methods need to be extended, taking service-specific aspects like the immateriality of the service, the concurrence of production and consumption as well as customer integration in the provision of processes into account.

The development of a modular service product portfolio is a prerequisite for a successful service strategy. It can be configured in a customer specific way and characterized by a repetition of the process steps. Industrial service processes have to be developed this way, leading to a competitive service product range through standardization, rationalization and automation.

The export ability of the service product is a further essential characteristic of the world-wide acting machine tool industry. Standardized service processes allow for its external processing, thus supporting the creation of cooperation networks for the global service provision. Modern information and communication techniques support such networks due to location-independent availability of expert knowledge. The creation of these networks requires elements of the potential and process dimensions such as remote supervision, -diagnosis and –maintenance. They offer the possibility to automate the service processes and allow for a time-independent provision and world-wide marketing of innovative services - underlining the strong interaction among the three dimensions discussed above.

4 CONFIGURATION OF CUSTOMER-SPECIFIC SERVICES

Material good-oriented modularization principles cannot be used due to the described characteristics typical for the service. The development of standardized service modules requires a new methodical procedure.

The first step is the identification of the process elements according to the result dimension. This task is performed as a process analysis of existing and planned processes providing services. The results of this analysis, in relation to the identification of process elements which can be standardized, lead to a number of unique service modules. In order to define a specific set of standardized service modules, the process elements have to be integrated or separated. The resulting modules will include primary processes (customer-oriented) as well as secondary processes (supplier-internal).

Company-specific secondary processes have to be separated from the primary processes as they would prevent a company-comprehensive standardization. This process can be carried out via a value chain analysis, followed by an expansion of service blueprinting [8,9].

A prerequisite for the core of a service module is the specification of the identified primary process. All primary processes determined will then be classified according to their dependency on the standardization potential. These process categories can be e.g. expert processes, logistic processes or assembly processes. The process categories determine attributes for the corresponding service modules. The attribution admits a supplier-independent description of individual modules and their later combination to complex service products (Fig. 3). The supplier-internal secondary processes will be derived from these service modules.

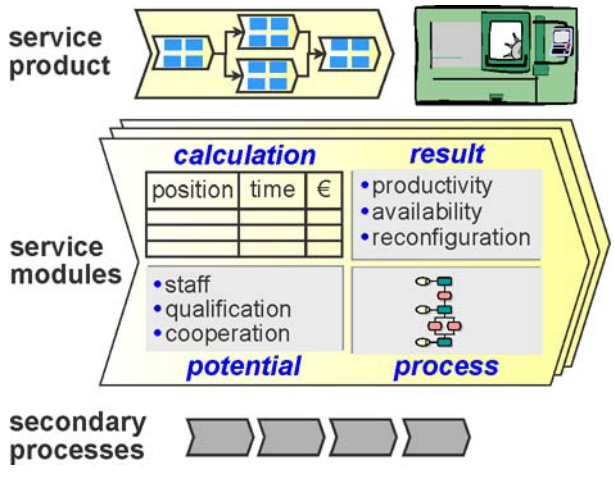

Figure 3: Configuration of customer-specific services.