

MHPWHITE PAPER

ENABLING A NEW FLEXIBILITY OF PRODUCTION

How Machinery Manufacturers and Producers Can Benefit from Asset-as-a-Service Models

Challenges for **Provisioning and Consuming Asset**as-a-Service Models in the Manufacturing Industry – A Dual **View from Producer** and Machinery Manufacturer.

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Introduction

Innovations in machinery and plant manufacturing stopped being restricted to products alone many years ago. Such innovations now cover entire corporate value chains – from customer-centric development right through to data-driven services in after-sales. New financing models and the adoption of results-based payment models from other industries (such as "Every-thing-as-a-Service" or "X-as-a-Service") are accelerating the rate of change, enabling everything from pure product innovations to business model innovations.

This potential for innovation is illustrated using FlexFactory as an example at the end of this white paper.

However, many of these models fail when it comes to adapting them to real-life circumstances – or that is the general assumption anyway. This white paper takes a closer look at the "Asset-as-a-service" business model and focuses on the use of production equipment in the shop floor environment. This scenario involves some very specific challenges with a high degree of complexity on both sides.

Broadly speaking, the model essentially involves machinery manufacturers making the switch from vendor to service provider. In other words, the company that manufactures the machine no longer sells it to its customers; instead, it allows them to use it as a service. Models of this type are already common in certain sectors such as agriculture and construction. In these market segments, demand is high for specialist machines that are required only sporadically so an outright purchase is not an attractive prospect for users. It is common practice for different consumers to share machines of this kind, with the service being offered either via an intermediary or the actual machinery manufacturer. The use of cranes or other industrial trucks at docks or similar freight hubs is another scenario where models of this type are relevant. The fleet of machines used to unload the goods often belongs to the company that manufactured them but the operator of these machines is the dock operator or another service provider that also takes a cut of the earnings under this rental model. The shipping company is responsible for unloading the goods and using the machines but clearly cannot and would not want to transport the required machines to each dock or store them in one location. Profitable Asset-as-a-Service models that offer a win-win solution for all parties involved therefore already exist.

This white paper examines the interests, opportunities and challenges relevant to both machinery manufacturers and producers. Producers can obtain their production equipment (industrial robots and tools, industrial trucks, etc.) via an Asset-as-a-Service model, but it is obvious that integrating this equipment into a production process and leveraging added value is not guite as simple as in the above examples. This is primarily due to specific conditions applicable to production environments, dependency on continuous production as a mission-critical factor for the company, the number of equipment suppliers and the sensitivity of the data used for production. To examine potential solutions, we propose below that a straightforward change in payment model is not enough. We also consider the other obstacles that must be removed before the potential of these new business models can genuinely be leveraged. We then highlight the contact points between the two types of companies that merit particular attention. Finally, we provide an initial recommendation for action by both types of companies.



Asset-as-a-Service Models as an Opportunity for Machinery Manufacturers

There are several good reasons for machinery manufacturers to make the switch from vendor to service provider. Yet the barriers and challenges can be almost insurmountable, especially in the industrial sector, since the switch must take place not only within the company itself, but also on the buyer's side or within the consumer's service business.

In markets like the automotive industry where "as-a-Service" and sharing models are already widely used, it is easy to identify the added value that could be transferred directly to suppliers of production equipment (referred to as the "asset" below). These models also facilitate new customer engagement campaigns: The machinery manufacturer or service provider is in direct contact with the customer for the asset's entire lifecycle. They must tackle the customer's requirements and expectations beyond the initial purchasing process, instead communicating on an ongoing basis and staying up-to-date with changing requirements over the asset's lifecycle. The machinery manufacturer therefore achieves a significantly higher level of customer-centricity, allowing it to respond more rapidly to changes in the market or new requirements from the customer. In addition, constantly collating field and user data is obviously the best way to continuously improve the machine in question and serves as an enabling factor, as in the case of closed-loop manufacturing. R&D departments no have a problem accessing specific data throughout the machine's entire lifecycle, such as condition or wear. The asset can therefore be developed and optimized based on genuine field values rather than laboratory simulations alone. Another bonus is the ability to enable customer-oriented diversification of the device using digital value-added services, or what are known as "function-on-demand" offers. Product improvements and enhancements are possible at any time, and can be made available digitally. As a result, machinery manufacturers benefit from two additional sources of added value:

1. Quality becomes a key competitive differentiator once again. The manufacturer profits directly from the reliability, longevity and future viability of its machines. It is no longer necessary to tolerate a trade-off between service life and purchase price/cycle.

An intenance of the machine becomes a task that can be handled directly by the machinery manufacturer, who can therefore decide independently when and who should perform maintenance, and which spare parts and wear parts should be used. Questions about warranties, certification or the use of generic parts become irrelevant.

Unlike new one-off sales, this model offers the chance to log orders and reliably forecast company turnover since rental models for machines are typically based on annually recurring revenue. Recurring revenue generally improves the market capitalization of a company.

However, these changes lead directly to challenges: The switch from vendor to service provider demands new business skills, including the provision and delivery of maintenance services using in-house or thirdparty resources. Yet even if third parties take responsibility for these services, specific business skills still need to be cultivated – managing engagement models, for example. In addition, new or more effective business processes that meet other throughput and scalability requirements become necessary. Examples include the capacity to monitor new contractual elements such as availability, response time or capacity. A high degree of customization through options such as usage-dependent billing per machine or the ability to process micropayments also calls for end-to-end digitalization of the company's processes.

The transformation of important KPIs in the company's annual report presents another challenge. In certain cases, annual subscriptions may account for a smaller proportion of turnover than the absolute value of orders received under the sales model. This makes it difficult to compare figures against the previous year and decide over which period of time a transformation of this kind should be disclosed. Being able to demonstrate continuity and growth to investors is undoubtedly a crucial task. In addition, common indices must be used to render a successful transformation measurable, not only to those inside the company, but also to outsiders.

The value proposition to the customer raises additional questions. After all, the customer must be convinced by the added value of a service over that of a purchase. One of the key questions that arises is how to handle a reduction in demand for production capacity – in the context of a global crisis, for example. It is possible to transfer some of the risk to consumers, but this is not a viable long-term solution. Even a commitment to a three-year subscription does not make up for the revenue that could have been achieved with a sale. It

follows that the long-term success of the model, and thus of the company, depends directly on the customer's success. Declining market demand is directly reflected in a decline in the company's own sales. Before explaining how this problem can be resolved, we will turn our attention to producers.

Producers

Producers are primarily interested in Asset-as-a-Service business models because of a desire to shift costs from CAPEX to OPEX. These models allow investments in machinery and plants to be replaced by monthly costs, or even usage-dependent costs in the case of results-oriented models. The latter establish a direct link between production capacity and production costs. At the same time, these models provide opportunities to respond quickly to demand and changes in the market. Since the company does not need to make major upfront investments in machinery and production equipment, it can trial the production of new products or adapt new and innovative production methods to increase the guality or range of functions of its products. The capital that has been freed up can be used either to increase the company's liquidity or to invest in product marketing to increase sales of the new products. As with service contracts, the new business models also make it easier to predict operating costs. The main difference is that the assets in the new models continue to belong to the machinery manufacturer who therefore also decides on maintenance work and the service technicians and spare parts to be used. The machinery manufacturer is naturally interested in a high overall equipment efficiency (OEE), based on availability of the machines, quality of workpieces and results, and performance measured as throughput of produced workpieces since this is how the asset can generate the most turnover.

Maintenance in particular is a recurring topic of discussion in connection with service contracts since competing interests are involved. The producer wants to minimize downtime while the machinery manufacturer wants to perform service work using in-house staff and install its own wear parts and spare parts. Under the Asset-as-a-Service model, the risk and responsibility are initially assumed in full by the machinery manufacturer on the basis of the SLAs offered. Yet the producer must also make a contribution. Potential areas for action include enabling and training in-house maintenance staff to carry out minor maintenance tasks in accordance with the machinery manufacturer's specifications, such as replacing wear parts. If the producer uses assets from multiple equipment suppliers, it will need to coordinate the respective external service teams and comply with health and safety standards.



Two Companies, One Shared Goal



In addition to the general characteristics of the Assetas-a-Service model, there are sector-specific features that must be considered as part of any evaluation and potential transformation. We outline the basic concept of the Asset-as-a-Service model below. The concept is explained in more detail in the side note at the end of this white paper, using FlexFactory as the example. We then address the opportunities, risks and new requirements on both sides of the business relationship.

New Business Models

The idea behind the Asset-as-a-Service model is not a new one. Rental and leasing are the best-known established variants. In these cases, the machinery manufacturer or lessor (the financial service provider) remains the owner of the machine; in some cases, ownership changes at the end of the lease, or the lessee is offered the opportunity to purchase the asset at the residual value. Once again, a specific payment model reduces the risk of a high upfront investment and capital commitment. Service contracts are frequently concluded as well with the aim of further reducing the transaction costs of maintenance and repairs for the producer, and providing the machinery manufacturer with a guarantee that a basic level of asset utilization will be achieved. However, the machinery manufacturer does not intervene in machine operation.

The situation is different in the case of Asset-as-a-Service models, which incorporate a performance guarantee. To guarantee overall plant efficiency up to a specific percentage, machinery manufacturers require not only access to the telemetry data generated by the machinery and plant, but also the authority to make remote adjustments to the controls if necessary. Here is an analogy to illustrate the procedure: The driver of a vehicle with an internal combustion engine and manual transmission receives instructions from the manufacturer of the vehicle about the best speed to change gear for achieving specific consumption figures.

In results-oriented business models, part of the entrepreneurial risk is transferred to the machinery manufacturer. A basic fee is levied, but the producer is also billed based on the number of parts produced or machine hours run. As well as its high degree of flexibility, this approach also provides scope for methods such as dynamic pricing. For example, the producer may be charged a different price for each machine hour during the product launch phase than each machine hour during the phase when the product has been accepted by the market, operations have become rou-



Figure 1: Relationships and interactions between different business units on both sides of the Asset-as-a-Service model

tine and line utilization is high. The machinery manufacturer therefore offers the producer a co-investment opportunity, but is also involved in the latter's business success during the later phase.

Established Relationships – New Tasks

A quasi-collaborative partnership, near real-time data exchanges and the interdependence between a machinery manufacturer's and user's interests create new opportunities for interaction between different business units, as well as new requirements for compliance, security and other technical enablers that are essential for successful production operations. The diagram in Figure 1 illustrates this interdependence.

Relationship between Purchasing and Sales

The purchasing department of a producer is faced with the challenge of purchasing new services that were previously offered via a sales model but are now billed according to a usage-based or even resultsbased model. This makes it necessary to re-evaluate the various offers and providers available. In certain circumstances, it can be very difficult to compare the total cost of operation over the machine's lifecycle on the basis of different billing-related metrics. Historical data on actual machine usage is often lacking, and there is very little to go on in terms of predicting productivity over the years to come. The purchasing department must therefore compare offer A for the purchase of a machine at a fixed price plus a predictable service contract against offer B for the price per unit produced. Only businesses with a high level of data transparency can determine which offer is most advantageous for both companies. Incentive systems that reward successful purchases often exist within purchasing departments, so changes are also required in this regard. If the volume of machine purchases was previously used as a metric, it may be necessary to switch to anticipated production capacity, perhaps coupled with a minimum guaranteed sales quantity.

Well-established incentive models on the machinery manufacturer's side will also need to be adjusted. If the success of a sales employee was previously measured on turnover from machine sales and service contracts (a predictable volume over a specific number of years), the target systems must now be adjusted to recurring income from the new business models. Failure to make such adjustments is a particularly common time sink for companies during their digital transformation. Even if the models exist, the lack of incentive systems means that they are not positioned for customers.

Financial Controlling

From a CFO's perspective, Asset-as-a-Service models offer key benefits on both the demand and supply side. If we return once again to the machinery manufacturer's perspective, there is a switch in turnover from one-off sales to annually recurring sales, similar to the switch in software licensing from "perpetual" to "subscription." Turnover forecasts for future financial years become much more stable. The annually recurring turnover is smaller than the absolute contractual value of sales; this metric-related change must therefore be prepared for and communicated to the market appropriately. If a machinery manufacturer offers a genuinely usage-based model, it will be directly influenced by market fluctuations on the demand side. To mitigate the risk, it is a good idea to reinsure certain sales capacities and to present the customer with an appropriate offer, working together with an insurance partner.

Once again, the benefits are easy to see for producers. Low investment costs and capital commitments result in additional investment options as an avenue to more profit. These models also provide opportunities to reduce operating costs quickly in the event of a drop in demand, and to expand infrastructure accordingly if demand in other product segments increases.

Research and Development

Machinery manufacturers have new opportunities for interacting with customers. Access to field data and machine monitoring over the entire lifecycle creates new possibilities for continuously developing and improving machines based on use cases such as closed-loop manufacturing, for instance. The shift from "orders for new machines" to "total lifecycle productivity" as an important KPI becomes a crucial paradigm in product design. Quality and reliability become competitive advantages to an extent never seen before, and sustainability becomes an inherent core competence. Guaranteed machine connectivity and remote access open up new possibilities, especially in terms of digital value-added services such as functions on demand or product diversification based on machine learning or artificial intelligence, which can be vital in certain use cases.

Operations, Repairs and Service Providers

The context of machine operation is a critical and very direct touch point for these new interactions between demand and supply. Cooperation in this area must run smoothly on a daily basis. It might initially appear that little needs to change in terms of production operations since the function and purpose of the machines in use do not change. However, the machines must now transmit specific data concerning their condition and usage to systems outside the production IT system. This is still inconceivable in many cases since machine and production data could give an insight into product call-offs and the company's economic development (for insider trading). Options for controlling and managing these data exchanges must be developed so that it is possible to customize the types of data that leave a plant. Data custodians and data intermediary services can play a key role as enablers.

Machine maintenance is another important factor. Maintenance and repair scenarios must be classified on the basis of their "severity." Knowledge of the machine as well as live monitoring of the machine condition should enable the machine operator to implement use cases such as preventive maintenance. This requires precise control of machine utilization and wear, ensuring that maintenance only needs to be carried out at specific intervals. As noted above, it should still be possible for an in-house maintenance team to carry out minor tasks under certain conditions provided that the service technicians have the appropriate training and necessary certification. Service providers would carry out scheduled maintenance operations at regular intervals. A specific approach must be agreed for high-severity cases that occur unexpectedly and could result in downtime on a production line or production island. In such cases, the service provider will be obliged to rectify problems within the agreed SLA period. One option might be to provide the necessary redundancies and remote support for on-site teams. The defective machine would then be serviced during one of the scheduled maintenance operations, and its replacement would be put into operation in the meantime.

Handling the logistics of several service teams and their differing maintenance schedules presents a greater challenge. New skills and processes are required to achieve this goal while still complying with safety requirements and other demands. Different schedules can of course be agreed for different equipment suppliers so that the teams do not interfere with each other's work.

Summary and Outlook

In summary, it is clear that Asset-as-a-Service models also offer significant added value in the production sector, potentially leading to a more agile economy and greater resilience overall. A company's level of innovation can be increased very quickly, and the innovation cycle of production and manufacturing processes can be shortened. The use of new technological opportunities forges close links between the partners involved in the value chain, which in turn creates lasting added value since the shared interest in business success is strengthened. At the same time, producers can respond faster to market changes, innovation cycles can be massively accelerated using field data, and innovations can be implemented more efficiently and decisively.

Where should companies start? Enabling communication between the provider and the consumer is vital. A good starting point is for machinery manufacturers to offer remote maintenance solutions along with value-added services or discounted SLAs for consumers. Crucial guestions about data classification, data ownership and – where applicable – data custodianship must be clarified. The machinery manufacturer gains deeper insights into the use of its machines while the customer benefits from new services and an improved user experience. Ultimately, the billing model is the only thing that changes but this is the just the beginning.

Based on its holistic consulting approach, MHP can support both machinery manufacturers and producers in their efforts to adapt Asset-as-a-Service models to their needs. We are happy to work with both sides to identify specific process-based and technology-based solutions in any context.

Asset-as-a-Service-Models also offer decisive added value in production.

EXCURSUS ON FLEXFACTORY

From Asset-as-a-Service towards Digital Production-as-a-Service

FlexFactory is a joint venture of MHP, Porsche, and Munich Re. It supports customers in reorganizing their production systems to think beyond the boundaries of production alone. Flexible production starts with a seamlessly digital value chain and opens up new business models extending right through to Digital Production-as-a-Service. This transformation is implemented using the following building blocks:





1. Digital Value Chain

The "Semantic Engine" software, which can be tailored to individual needs, closes the digital gap between product development and production planning. It enables the seamless and automated transfer of product data into process data. Less manual planning effort when retooling a production line to switch from product A to product B increases efficiency and reduces the likelihood of errors. This allows more frequent product changes and reduces dependency on a single main user of the production line – assuming that the line is flexible.

2. Flexible **Production Concepts**

The modular "Multi Product Line" uses an optimized cell layout as well as automated guided vehicles, enabling highly flexible and scalable production for individual small series or frequent product changes. This opens the door not only to further efficiency gains, but also to completely new approaches. Innovative business models are made possible by offering production capacity to third parties – in other words by making the leap to X-as-a-Service.

This solution is suitable for manufacturers in different industries (see next page) that are open to new production technologies and need to increase the flexibility of their production processes due to smaller or fluctuating lot sizes. On the financing side, the associated investment risk presents a challenge that conventional approaches can rarely solve. Now it is possible to fundamentally rethink production up to the entry into a new business model.



3. Financial **Transformation**

a) Performance Guarantee

FlexFactory guarantees the technical availability of the production line and compensates extra costs of production results that are not as agreed. This guarantee reduces the risk of temporary downtime and makes investments more manageable within strategic decisions about innovative production technologies. Since production-related risks are guaranteed beyond the machinery and equipment manufacturer's warranties, the higher level of risk transparency means that the production line can be opened up to external investors.

b) External Financing Options

Companies no longer need to own production lines; they can access the assets according to their needs and purchase the manufactured products from a special purpose vehicle. This legally separate entity assumes ownership and - in conjunction with increased flexibility and a performance guarantee – opens the door to external financing under optimized terms and conditions. This approach reduces both investments and fixed costs, while at the same time providing control over the production line and the quality manufactured - Digital Production-as-a-Service taken to its logical conclusion.

EXCURSUS ON FLEXFACTORY

The offering is targeting a broad set of manufacturing industries – focusing on four different target groups



AUTOMOTIVE SUPPLIERS

Tier 1: Drive transformation despite rating downgrades, unsatisfied capital market, and limited credit lending

Tier 2-3: Enter asset-backed refinancing beyond credits denied and without refinancing on capital market



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New Competitors: Kick-start production facilities in an open "greenfield" approach and gain independence from venture capital









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MANUFACTURERS OF GOODS WITH HIGH PRODUCT VARIANCE

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