Service Description I Version 4.0

PRODUCTION PLANNING & CONTROL (Cloud)

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1. PRODUCTION PLANNING & CONTROL: Introduction

ISTOS GmbH, a DMG MORI company, offers software solutions for supported manual as well as integrated automated planning and feedback of production orders under PRODUCTION PLANNING & CONTROL (Cloud) and PRODUCTION PLANNING & CONTROL - PRO (OnPremise).

The challenges in planning are to take limited resources into account and to responding directly to short-term changes. PRODUCTION PLANNING & CONTROL provides a direct connection to all machines and workstations, ensuring a continuous flow of information between planning and production and making it possible to react quickly to changing situations on the shop floor.

Operated in the cloud the web-based solution **PRODUCTION PLANNING & CONTROL (Cloud)** comprises three modular applications: **PLANNING BOARD**, **PRODUCTION FEEDBACK** and **PRODUCTION COCK-PIT** and offers an easy introduction into optimising production planning and control.

PLANNING BOARD serves as the basis for manual planning with assist functions that easily replace planning in EXCEL or with analogue planning boards. The PRODUCTION FEEDBACK module directly reports the current production progress from the workstation to the PLANNING BOARD. PRODUCTION COCKPIT visualises production-relevant data at a glance and acts as a control station by means of its customisable display.

An overview of the PRODUCTION PLANNING & CONTROL applications:

- PLANNING BOARD
- PRODUCTION FEEDBACK
- PRODUCTION COCKPIT

PLANNING BOARD, PRODUCTION FEEDBACK and PRODUCTION COCKPIT are web-applications and are offered as Software-as-a-Service.

The hardware requirements for these products can be found in chapter 3.

2. Performance specifications of the products

2.1 PLANNING BOARD

PLANNING BOARD is a **digital planning board** with assist functions to facilitate planning of production orders. The software offers an easy introduction into optimising production planning while taking limited resources into account and thereby supports manual production planning.

During the planning process, PLANNING BOARD takes limited resources, such as workstations, machines, assembly stations and employees into account during the planning process. External supplies of materials can also be considered.

PLANNING BOARD has clearly structured assist functions which significantly reduce the complexity of manual planning. The user can also easily move jobs by drag & drop.

PLANNING BOARD functions for order and production optimization:

- Creating workstations or machines
- Creating articles with corresponding task lists
- Taking shift models and special times into account
- Scheduling of production orders to workstations and employees
- Real-time integration of manual feedback from PRODUCTION FEEDBACK (if available)
- Simple evaluation of the planning results

2.2 PRODUCTION FEEDBACK

PRODUCTION FEEDBACK is a software for **production data acquisition (PDA) and feedback**.

PRODUCTION FEEDBACK can be used to directly report the status of production orders and their results with time used and the number of parts produced as well as possible malfunctions back to PLANNING BOARD. This allows a short-term reaction to changes in the production process, by considering delivery dates, costs and quality. This constitutes the basis for agile production.

In PRODUCTION FEEDBACK, the machine operator enters the current production status directly. All order processes are divided into two activities – set-up and machine processing for production. This is the production data acquisition (PDA). All feedback can be exported in CSV file format.

One example:

Production orders are created in PLANNING BOARD, scheduled and transferred to PRODUCTION FEED-BACK. The machine operator can now call up these production orders on the terminal (directly on the machine panel or via a separate device). It is now possible to provide continuous feedback of the current status during the production process. The feedback can take place via a standard PC, tablet or integrated in CELOS (version 6 or higher) on DMG MORI machines. Changes are displayed in real time in PLANNING BOARD as a result of this feedback. This allows the planner to manually adjust and update the production planning directly.

PRODUCTION FEEDBACK includes the following core functionalities:

- View of all production orders
- Time and quantity recording of production
- Feedback of orders from production to the PLANNING BOARD

2.3 PRODUCTION COCKPIT

PRODUCTON COCKPIT is an application that accesses data and information from the PLANNING BOARD and PRODUCTION FEEDBACK, bundles it on a **single dashboard** and allows you to display the key information you need in an overview.

PRODUCTON COCKPIT includes a selection of predefined widgets that can be displayed on a dashboard. Each user can compile dashboards and overviews for his specific use case.

This application and its features provide a tool for visualising and communicating information in a wide variety of use cases and can be customised to suit individual requirements.

2.4 Manufacturing Service Bus & Core Services

2.4.1 Manufacturing Service Bus

Many manufacturing companies plan on networking applications and machines in order to make production more efficient and flexible. This radically changes the demands on the IT infrastructure. Moving forward, the IT infrastructure must be continually able to adapt to changing data structures and new business requirements to enable permanent end-to-end communication between applications in companies and beyond and to ensure interoperability between all systems.

On the other hand, implementing different software solutions today is often very time-consuming and costly since each solution provider works with their own data formats and a proprietary data structure. What's more, the interfaces of new applications and cloud services must be extensively adapted in order to establish communication among each other.

The Manufacturing Service Bus (MSB) from ISTOS is a consistent integration layer with a standardised data structure and data description. It replaces the complicated network of end-to-end connections in the application landscape with a communication infrastructure that is used by all connected endpoints (applications, service providers and users), allowing them to communicate with each other on the basis of the recognised data format (JSON Schema), industry standard ISA 95 and an ISTOS – specific extension.

Compared to other Enterprise Service Bus systems, the special feature of the ISTOS MSB is the fact that it specialises in the manufacturing industry and therefore specifically allows scenarios where applications can be integrated in production processes and data-intensive applications in production.

Details on functionalities:

- Common data formats (described by JSON Schema)
- Recognised industry standards (ISA 95)
- Communication protocol (Kafka)

Note: The MSB cannot be purchased separately. It is used to exchange data between the individual applications of PRODUCTION PLANNING & CONTROL - PRO and cannot be used as a stand-alone product.

2.4.2 Core Services

The Core Services are a subset of the MSB. They translate the complex data structure, which is based on ISA 95, into a comprehensible and user-friendly interface.

The Core Services are used for global data management and represent master systems. This means that they can serve the same objects in different data sources and thus offer maximum flexibility and stability in communication between applications. A Core Service has been developed for each data object. The following Core Services are delivered:

- **Production Order Service** – For order data, such as product, quantity and delivery date.
- **Material Service** – For purchasing and production parts
- **Equipment Service** – For manufacturing resources such as machines and tools
- **Routing Service** – For master data or order-related routings
- **Calendar Service** – For calendar entries such as vacations or machine maintenance intervals
- **Confirmation Service** – For feedback from production into planning
- **Schedule Service** – For planning data of the planned production orders
- **Organization Units Service** – For grouping individual resources
- **Employee Service** – For production employees
- **Shiftmodel Service** – For the definition of shift models
- **Shift-Model Assignment Service** – For assigning shift models to resources
- **Bill of Material Service** – For master and order related bills of material
- **Purchase Order Service** – For purchase orders
- **Demand Service** – For customer orders and stock requirements
- **Material Relation Service** – For material relations in planning
- **Time Log Service** – For time recording of secondary times

Each core service is built the same way in its endpoints and has the common CRUD interfaces.

3.   Technical requirements

Browser

- Google Chrome (version 61.0 or later)

Hardware

- At least full HD display (1920x1080)

Network

- Permanent Internet access

4.   Service and Support

PRODUCTION PLANNING & CONTROL allows its participants to use the PRODUCTION PLANNING & CONTROL platform. The platform can be used in a web-based manner via a web browser at the Internet address planning.cloud or planning-control.cloud. PRODUCTION PLANNING & CONTROL is entitled to change and expand the functional scope of the platform without notice. PRODUCTION PLANNING & CONTROL is entitled to restrict or remove individual functions with at least six weeks' notice.

PRODUCTION PLANNING & CONTROL will take appropriate measures to protect the platform and data from unauthorised access. PRODUCTION PLANNING & CONTROL will always select what it considers to be the most effective and secure encryption technology for the encryption of platform data, taking into account the state of the art, which allows the platform to be used efficiently. There is no entitlement to a specific type of encryption. PRODUCTION PLANNING & CONTROL assumes no liability for the integrity of data (including subscriber data) transmitted via the Internet or other computer or telecommunication networks that are not operated or controlled by PRODUCTION PLANNING & CONTROL. Furthermore, PRODUCTION PLANNING & CONTROL does not guarantee that third parties will not access this data during transmission. Please refer to https://servicetrust.microsoft.com/ for the exact security certifications of MS-Azure.

PRODUCTION PLANNING & CONTROL ensures that the PRODUCTION PLANNING & CONTROL services and the MS-Azure servers as well as the data paths up to the transfer point to the Internet (backbone) are available at least 99% of the time on an annual average. Excluded from this are times in which the servers cannot be reached via the Internet due to technical or other problems that are beyond the control of PRODUCTION PLANNING & CONTROL (force majeure, fault of third parties, e.g. DDOS attacks etc.).

PRODUCTION PLANNING & CONTROL will periodically perform a backup (complete data backup) of the data stored on the platform to secure the subscriber data, but no less than once a week. PRODUCTION

PLANNING & CONTROL shall not be liable for the loss of data entered after the last regular backup, or for consequential damages resulting from the loss, as long as and to the extent that the scheduled backup cycle has been observed. PRODUCTION PLANNING & CONTROL is entitled to shut down or disconnect the main computer (server) for maintenance work. The maintenance measures shall be executed for the subscribers in such a way that the disruption remains as low as possible. Regular or scheduled maintenance work shall be carried out at times with the least possible usage and shall be announced in advance if it is expected to be for a considerable period of time.

5. Services

All PRODUCTION PLANNING & CONTROL products are offered on a subscription basis, which is available in various volumes. These are Service-as-a-Software. The scope depends on the number of workstations to be integrated. The order transaction is handled by ISTOS GmbH. Once the order transaction has been completed, the customer will receive his access data for PRODUCTION PLANNING & CONTROL by E-mail. This data allows the customer to log in to the licensed applications via his browser. Furthermore, it is possible to use the management of DMG MORI Digital GmbH for networking the machines. This is not included in the scope of delivery of PRODUCTION PLANNING & CONTROL.

The PRODUCTION PLANNING & CONTROL products are available in German, English, Italian, Dutch, Polish, Czech, Hungarian, Romanian, Greek, Slovenian, Croatian. Further languages can be requested.

The ability to connect ERP systems easily and via open interfaces is given (see Core Services). The connection of external systems to PRODCUTION PLANNING & CONTROL is the responsibility of the customer. ISTOS can provide support after individual agreement.

The scope of services does not include:

- DMG MORI Connectivity (machine networking)
- Connecting to the customer's third-party systems (e.g. ERP or CRM)
- Integration into the existing IT system landscape

If you have any further questions about our products, please contact your personal contact or send an E-mail to: info@istos.com