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A KOMAX COMPANY

Leading Software Solutions for Wire Harness Production

4Wire Px

Control of all Production Processes

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The production areas after the cutting area are moving more and more into focus. The manufacturers of wire harnesses need more efficiency, improved quality assurance and more transparency in these areas.

4Wire Px delivers all of this. With Px, products of any complexity, right up to complete wire harnesses and the associated production plans, can be described. Px controls production and documents all work steps. Processing standards ensure that uniform procedures and parameters are used. Quality assurance triggers during production ensure a high-quality standard.
When 4Wire Px is used together with 4Wire CAO, the two systems exchange all neccessary data to enable complete documentation of production and comprehensive traceability.

4Wire Px sequencing

Customizability

Many elements that are the foundation of the basic system framework can be defined and reconfigured, enabling for a quick and convenient response to changing requirements.
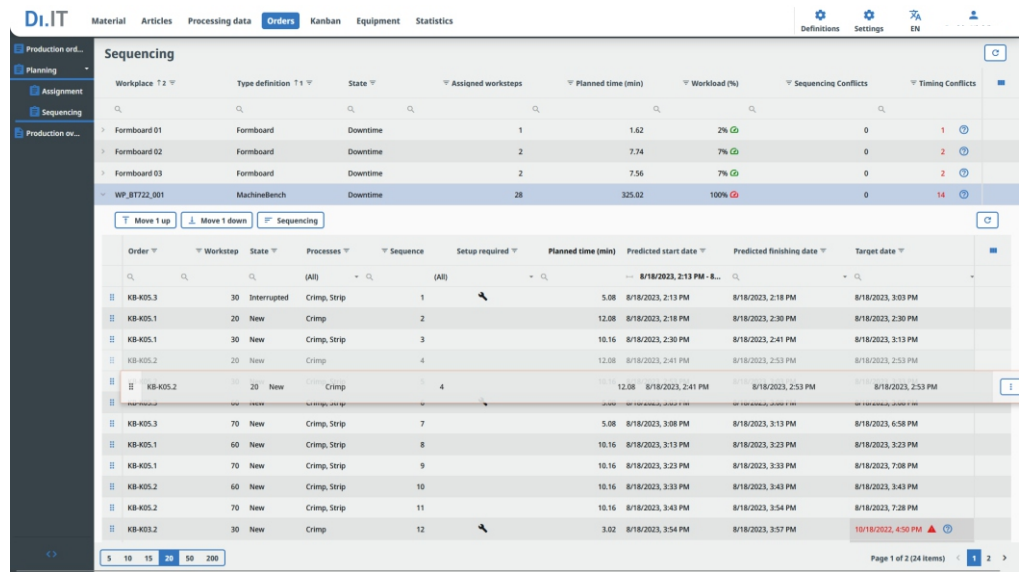
Material

Any material can be represented in Px with its appropriate master data information. This includes representation of subcomponents of complex materials (e.g. multicore wires, connector modules). Both defining the required material types and their properties is part of the system or customization concept.

This approach yields several benefits, e.g. it enables for responding to new manufacturing requirements quickly. It also helps to ensure process and data integrity by utilizing defined data types for specific material properties (wire cross section areas, colors, etc.).

Processes

Processes are the most fundamental elements within Px. They can be defined freely by naming them, but each process definition can also contain its own specific description of the element constellation allowed.

Px uses the defined processes to control:

- The provision of process related data (and QA activities) for each production plan
- The validation of the content of each production plan
- The capabilities of each equipment instance (e.g. machines)

Articles

Articles being produced in cutting area ("P1") have a relatively simple structure. In subsequent production areas ("P2", "P3") articles become more complex. They continue processing of previously produced articles, creating modules up to complete wire harnes-ses. In Px articles of all these different levels of complexity and their hierarchies can be described in detail.
Each article in Px can have multiple production plans, to represent manufacturing variants. Each production plan consists of a "Bill of material" and a list of "Work steps". Work steps consist of one or several "Process steps" that are carried out as one consistent sequence on the same workplace.

Production Quality

Px offers the possibility to define QA activities (measurements), that will be requested to be carried out at certain times during the production workflow. Measurements definitions can be linked to process related data, using parameters as placeholders to be filled in with their values in the specific context of each process step.

Equipment

Any type of equipment can be represented in Px. Using categories such as tools, machines or benches, Px enables to describe equipment on the different "hierarchy levels" of a workplace in detail, when needed.

That enables for a very flexible definition of different manufacturing environments, always adapted to the appropriate degree of detail. Each equipment entity can be enriched with detailed constraints that could reflect technical limitations as well as organizational aspects. Workplaces can be enriched with additional preferences for automatic workload distribution.

Planning

Orders in Px can be created on demand (e.g. by an ERP system) or by using the existing cycles in Px.

The jobs resulting from these orders can be assigned to appropriate workplaces (manually or automatically), respecting the process capabilities and the restrictions / preferences of each workplace and its hierarchy.

Sequencing of the assigned jobs of each workplace is based on user-defined rules, and each workplace can be assigned a specific sequencing rule to be applied automatically after carrying out the automatic workload distribution.

Production

4Wire Px enables a consistent production workflow across all workplaces, regardless of machine interfaces used.

Based on the master data of each job, the required quality assurance is requested at several points of the production workflow. Px automatically recognizes whether samples are to be produced or whether the measurements may be performed on production parts. If necessary, e.g. due to insufficient material supply, each job can be interrupted and resumed at a later time without obstructing production.

Traceability

Both product and process traceability is supported by Px. That means the composition of each produced article can always be traced, selected additional process related data can be persisted together with the product traceability model. Depending on the information provided during production (e.g. providing a lot information on raw materials, splitting production units on resupply, etc.) different levels of traceability details can be achieved.

Connectivity

Px is intended to deal with a major challenge for a system operating in all production areas, which is the requirement to connect to a variety of different devices. For facilitating these integration scenarios, Px provides generic, easy to use interfacing services.

Native Vendor Interfaces

Most devices delivered by commonly established vendors come with dedicated interface connectivity. Px supports these native interfaces to ensure optimal utilization of the equipment capabilities.
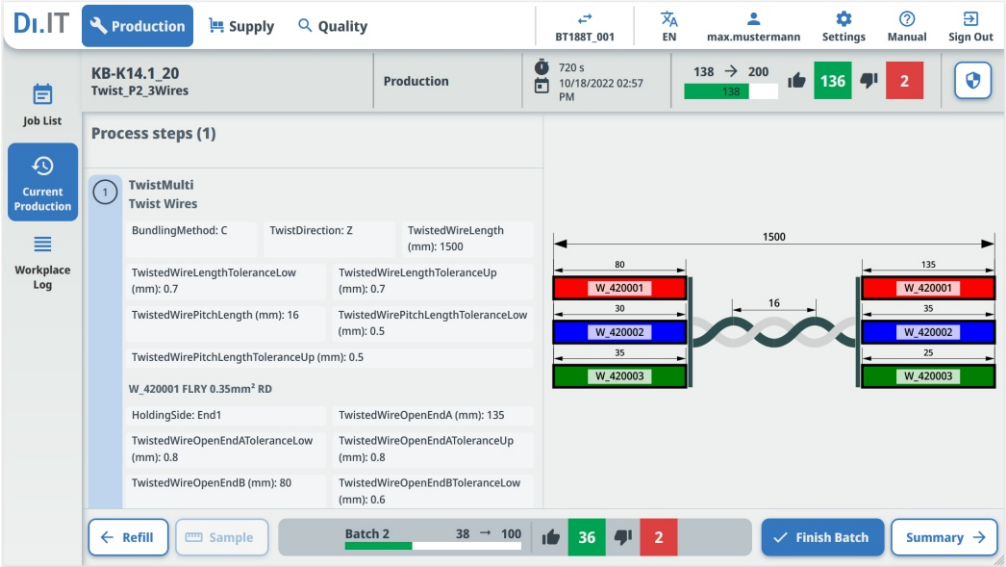
General Device Interfaces

Especially in the P2 area, there are devices that are not covered. These could be devices from smaller vendors or custom-built equipment, providing different interfacing solutions or no integrated connectivity at all (only achievable by additional augmentation). Px provides a foundation to connect these devices for the most important use cases by exposing general connectivity options.
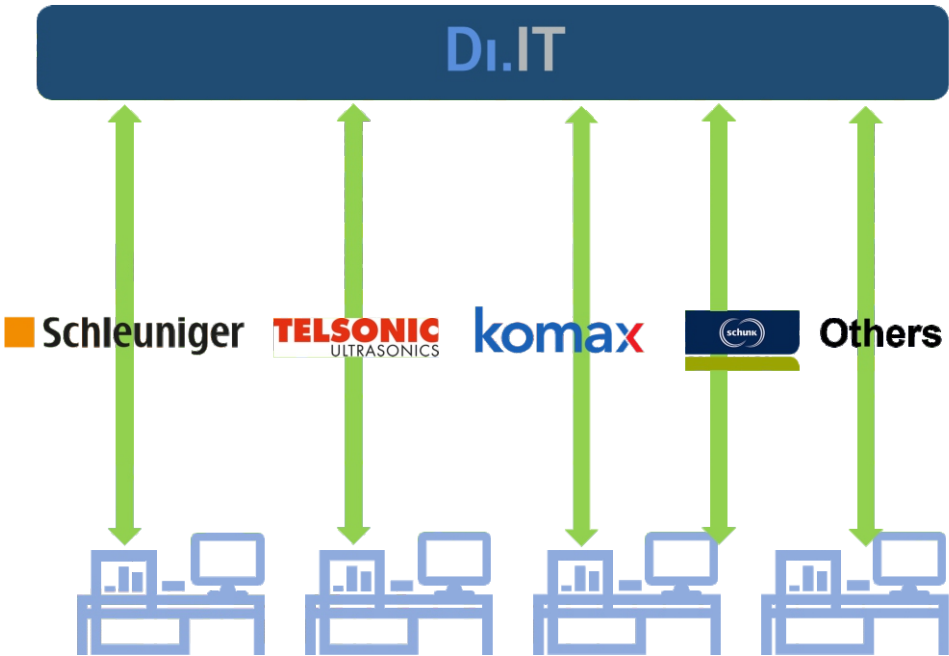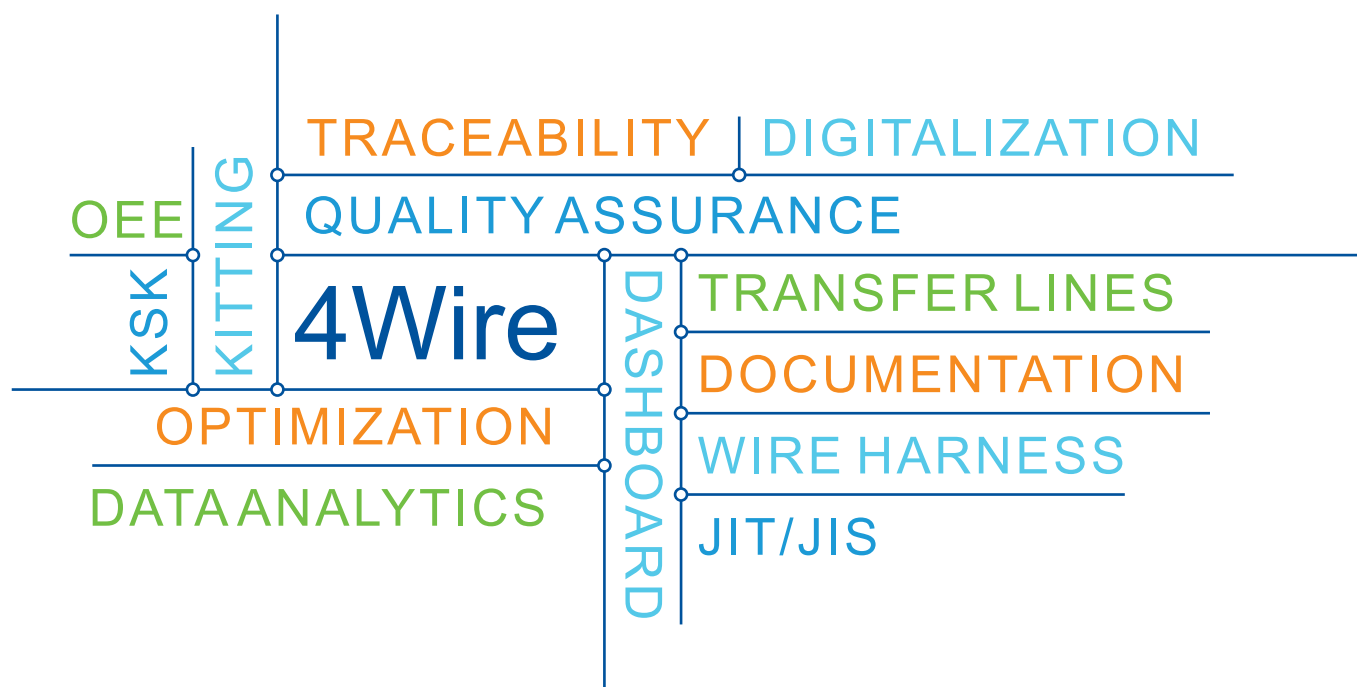
System Requirements

Px runs as services and can be operated in a variety of environments (regarding operating system, database etc.).

All Px user interfaces are provided as web interfaces, so any device is able to run a modern (chromium based) browser can be used as a display device, e.g. budget-priced tablets at workplaces in the shopfloor area.

4Wire Px shopfloor production

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TRACEABILITY **DIGITALIZATION**

OEE **QUALITY ASSURANCE**

KSK **KITTING** **4Wire** **DASHBOARD** **TRANSFER LINES**

DOCUMENTATION

OPTIMIZATION **WIRE HARNESS**

DATA ANALYTICS **JIT/JIS**

Complementary System

Locations

4Wire CAO

The software solution 4Wire CAO is the leading manufacturing execution system for the cutting area. Together with 4Wire Px, it is the only system, that is used worldwide and supports all languages.

The system has interfaces to machines from Komax, Schleuniger, Artos, Komax, ShinMaywa, Schäfer, Yazaki and others, which are continuously updated in close cooperation with the machine manufacturers.

That is why 4Wire CAO has the latest and the largest scope of functions for the cutting area and is therefore a de facto standard within the wire harness industry.

The software solution 4Wire CAO is flexible, scalable and efficient and already successfully installed by many global companies. Due to the integration to 4Wire Px, 4Wire CAO is also beneficial for small and medium-sized companies.

Head Office Krailling/Munich

DilT GmbH
Justus-von-Liebig-Ring 11a
D-82152 Krailling near Munich
Phone +49 (0)89 - 89 32 50 - 0
Fax +49 (0)89 - 89 32 50 - 50
info@diit.de
www.diit.de

Branch Office Berlin

DilT GmbH
Am Borsigturm 33
D-13507 Berlin
Phone +49 (0)30 - 64 0996 - 35
Fax +49 (0)30 - 64 0996 - 36
sales@diit.de