klar:suite for generating configuration and price lists for Crown forklift trucks

From Klarso GmbH

Crown – The right model for every requirement

Crown designs, manufactures, sells and services powered industrial forklift trucks from the smallest pallet truck to the largest very narrow aisle truck. Crown has an extensive global production, sales and service network with 18 manufacturing sites around the world and over 500 sales offices in 84 countries. The products are tailored exactly to the respective application requirements and differ – to name but a few of the options – in lifting height, load capacity, drive system, fork attachments and various accessories. Correspondingly, there are many configurations and individual prices.

Crown was looking for a system for the European headquarters to efficiently maintain their configuration and price data, as well as to automatically output their price lists adapted to countries, languages, currencies, markets and distribution channels. The system was to display product data, configuration rules, prices and their dependencies without redundancy, maintain them easily, check automatically for consistency, produce price lists dynamically for the first time and form an improved basis for the further digitization of marketing.

Klarso successfully implemented *klar:suite* in an agile project with the following milestones: (1) Prototype for validating the approach and workflow; (2) building the semantic network with data merged from all sources, data verification, rule validation, data cleansing; (3) rollout of the desktop software with functions to maintain and update rules and data in structured workflows; (4) automatic generation of PDF catalogs with configurations and prices.

Klar:suite now enables Crown to manage product data without redundancies or errors for marketing and to implement and distribute even complex price changes much faster. For the future, the Klarso system will thus form a

product database for further digitization of marketing and for closer system integration with ERP data and the sales system. The further development can take place at any time in an agile way also in small steps according to concrete project needs.

All beginnings are easy: Prototype

With the powerful approach of *klar:suite* it was possible to develop and present a prototype system within 1½ days tailored to price list generation with Crown data. The unique semantic database architecture and the quickly adaptable special tools of the user interface permit the necessary flexible data preparation and maintenance including consistency check and validation of the complex data as well as new long-term query and provision options – and Klarso GmbH received the order.

Data migration and Single Point of Truth

To build up a complete and cleaned up product information database in *klar:suite*, different data sources were used and consolidated.

In the past, the marketing department maintained the price lists in Excel tables and typeset them manually in InDesign. There was no automatic conversion of prices to the more than 20 target markets with their respective currencies and various price scales. In addition, the same data has been and is still maintained for production and orders in the ERP system and for transfer to the field service in the sales system of the American parent company.

As a starting point the data for *klar:suite* was taken over from the ERP system, since not only the final prices are displayed there, but also the exact dependencies of the prices on the characteristics and the permitted product option combinations in a complex rule system.

However, the dependencies are not explicitly expressed there, but in the form of thousands of script code snippets, which are only executed (evaluated) by the system if necessary. This code is also created and maintained by Crown employees.

- Crown Europe sells customized products to customers in over 20 markets with appropriate languages and currencies. 27 series are

Adjustments and updates are cumbersome with redundant data storage due to manual work. Flaws and inconsistencies are unavoidable

Information-rich representation of all content relations and dependencies for full data utilization and a future-proof data model

offered, each with 2−4 truck models, 50 options for 30 features, for which there are product option conditions that make up about 200,000 lines of code in the ERP system.

- The general price list contains 8,000 entries with around 5,000 conditions about which prices and which values ranges for characteristics apply when (70,000 code lines in the ERP system) − making pricing so complex.

For the import, the ERP code, which is formulated in complex nested IF-THEN-ELSE constructions, was parsed and converted to a normal form. Thus, the statements are now available as individual statements and could be checked for contradictions. Code errors of various types have become apparent, for example when different prices are assigned for the same configuration options or individual code sections could logically not be reached at all.

The sales system was used as a further data source. The different data organization required some heuristic approaches in order to achieve full matching. With the successful mapping in 2017/2018, price updates can now be completed mostly automatically, making the tedious manual data transfer from the price list PDFs superfluous.

In order to complete translations and the usual divisions of the product options, it was decided during the course of the project to additionally import the Excel tables mentioned above.

When importing ERP and Excel data, the mapping between corresponding data was recorded by special relations: external IDs and other associated data were stored in suitable entities or attributes for future use.

If data is missing or inconsistent on one side in the mapping process, the user must decide which data is to be transferred. This has been made easier with a special editor and output mode in which an existing or non-existent coverage is highlighted in color. In this context, inconsistencies and errors become visible at other levels, for example, with regard to option categorization, notations and descriptions.
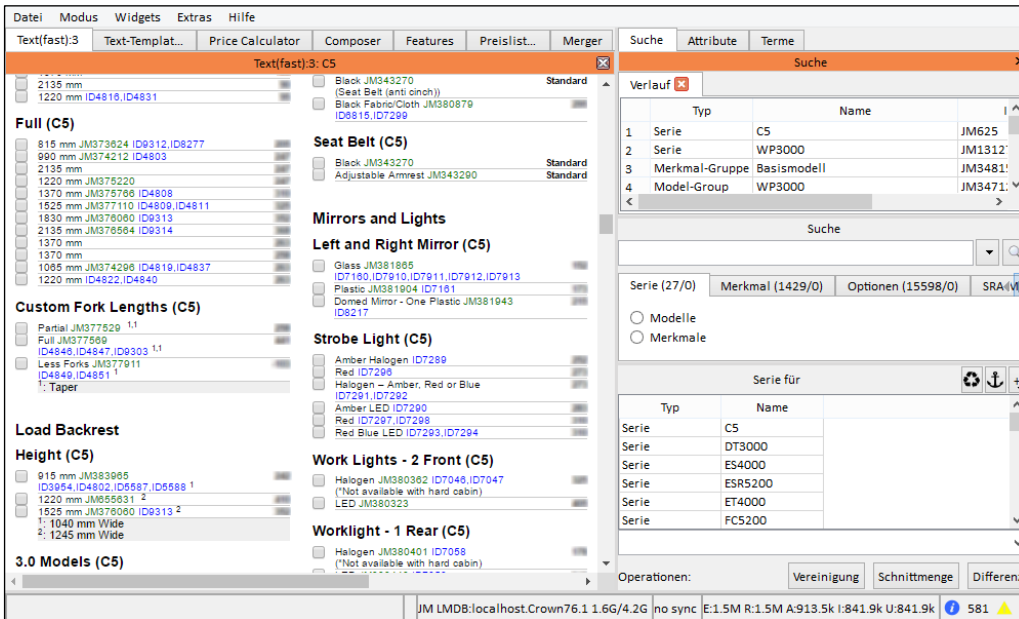
Figure 1: Visualization of the data mapping by color in the familiar price list layout view

Tailor-made Workbench facilitates maintenance and workflow

The system-supported preparation and post-processing of the data took up the most time during the 8-month implementation phase and had to be completed before the first price lists could be created and delivered by the system.

During the annual price update, the prices are often changed in groups of features. Once the connection between features or options and groups has been established in the semantic network, price changes can be carried out directly for entire groups in the price calculator. Up to now, this has required hundreds of manual adjustments to the price list documents. This was a key reason, why a new price list was only issued annually.

Special editors are designed in close cooperation with the Crown team as required to facilitate appropriate data mapping and data maintenance:

In the **feature editor**, the various features of the different series are divided into the feature groups already mentioned above. This grouping is taken into account in the price list output for all series, so that the output is uniform and therefore more consistent for sales.

By semantically mapping the relationships in a way the computer can understand, complex information can be maintained more **reliably** and **smartly**.

The **composer** is used to edit the conditions for the prices and their properties as well as their grouping into bundles. Bundles are the small groups or headings in the price list that typically combine the selection options for a specific feature, such as the desired wheel type.
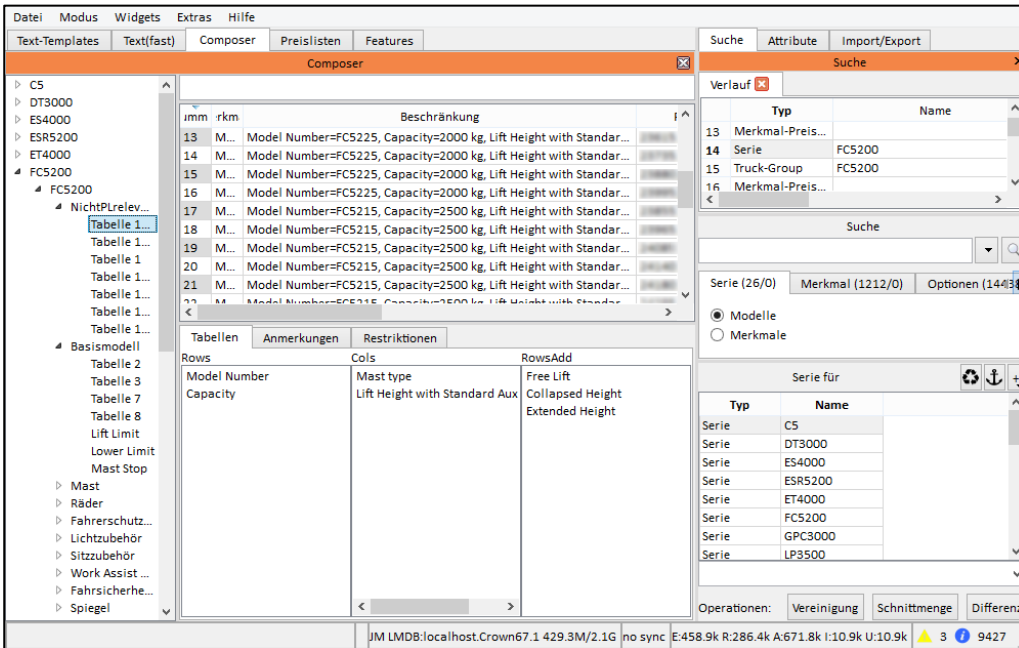
Figure 2: Customized views and tables. All elements allow drag'n'drop and drilldown.

The **template editor** is used to creates notes as general text modules. These can include placeholders for the names of linked elements to minimize the number of required text modules. Text modules can be simply drag'n'dropped into the composer window to link them to the respective elements.

Using the **price calculator**, marketing can preview price adjustments in groups or series and then release them with a single click.

Automatic price list generation with configurations

The PDF price lists are output automatically from the system at the click of a button – multilingual for all target markets and with all country- and market-specific requirements. All the tables and option combinations for the price lists are now rule-based and automatically structured from the many individual feature lists and conditions, so that a redundant, explicit tabular representation is no longer required.
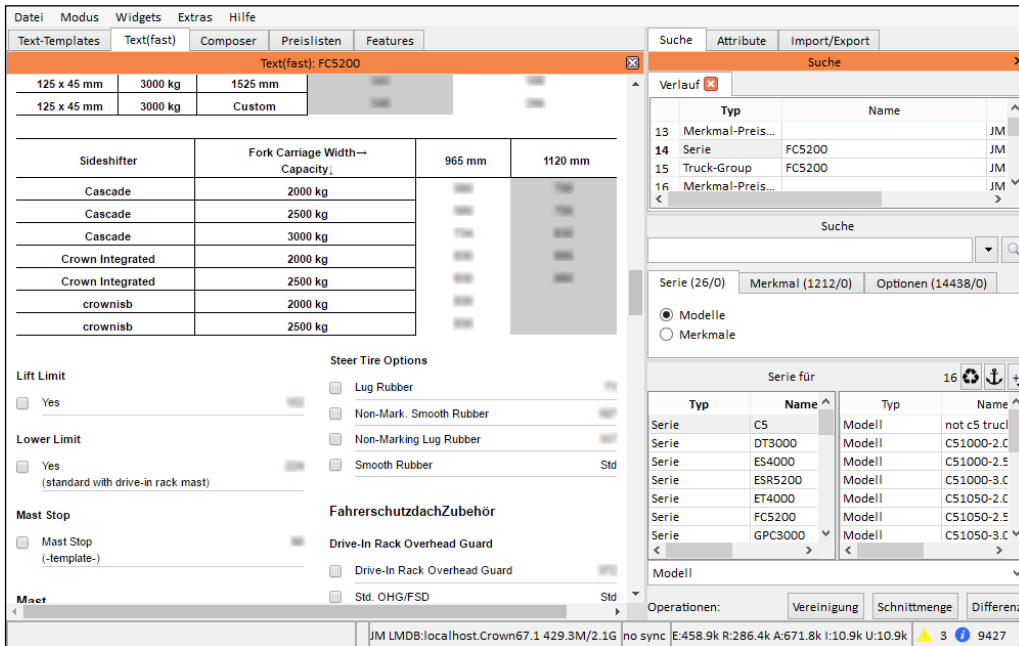
Figure 3: Editable preview of the price list output

The familiar price list view is also available at any time in the text editor, which displays type-dependent, dynamically generated and editable print layout views, e.g. for a truck series. When editing, the changes are written back directly to the respective source data elements.

Information hub and long-term benefits

With the transfer of the unreduced ERP data, the successful mapping and enrichment with other data sources, the semantic database of *klar:suite* lays the foundation for the next generation of marketing and sales solutions.

The *klar:suite* can serve as a single point of truth, as a suitable basis for further business applications: Marketing support such as price setting, sales support such as up-to-date digital configuration tables and price lists as well as general process improvement by mapping complex product rules and data workflows.

The project outlook includes an update interface to the ERP system, for which *klar:suite* automatically generates the required ERP script codes and the redundant manual maintenance effort is significantly reduced.

Flexible link for migration processes

An interesting project extension is emerging for the creation of the service manuals: On the one hand, the components and their association with certain models and service processes can be easily mapped and the current

overviews can be output in PDFs at the push of a button. On the other hand, the integration of component information provides a basis for further applications, such as component dependent pricing.

Furthermore, the *klar:suite* can output interactive price lists that depict the mutual dependencies of product options and thus contribute to order simplification. Or, if required, the sales department can create and print price lists tailored to specific customer requests.

Content validation, complex analysis and configuration for order validation

Klarso's commitment is that software can grow organically along the developing project requirements. Klarso supports customer projects in a long-term and solution-oriented manner. The software architecture of *klar:suite* is characterized by scalability and sustainability, which makes the system future-proof for new data model adaptations, short product cycles and increasingly special customer requirements.