The TIM as an integration platform – automated data exchange between different IT systems

The integration of IT systems along the entire value chain has not yet been implemented in many precast production facilities. In most cases, partially automated or manual database tuning activities result in the existence of various separate databases in the IT systems in question (ERP, CAD, MES, etc.), which in turn will result in substantial extra work ending up in information only being transmitted incompletely. The undesirable outcome of such developments are obstructed and defective bodies of information.

By offering its Technical Information Manager (TIM) to the market, Precast Software Engineering GmbH is now providing an integration platform that automates and hence sustainably improves the information exchange between different IT systems. This in turn enhances the quality of the process as a whole, does away with errors, and satisfies the needs of users and customers in a much better way.

While process optimization in the automobile industry has already been state of the art for a long time, this philosophy has not yet penetrated the precasting business to a substantial extent, especially when it comes to the use of IT systems. There may be a number of highly specialized user software systems in the market that fairly well cover partial aspects. However, the data exchange between the systems themselves is usually limited to the manual development of production data in CAD (PLANBAR by Precast Software Engineering) for MES and the manual export of accounting and invoicing in CAD for ERP. Responsibilities here chiefly rest with the users themselves, who, with the awareness of the current state of project planning, have to decide on their own when new data should or must be generated. This may result in the possibility that information within the individual participating and isolated IT systems is obsolete and materials to be ordered, for instance, will not be available on time on account of short-term modifications, or that, in the worst case, projects are planned and products are delivered to the customer on the basis of outdated processing information.

Together with two pilot customers, Mischek Systembau GmbH in Gerasdorf (Austria) and Betonwerke Elsäßer in Geisingen (Germany), Precast Software Engineering therefore developed and implemented a modern and flexible concept where the TIM (Technical Information & Integration Manager) serves as an integration platform between participating IT systems to arrive at a process-oriented data exchange between these systems.

"By introducing the TIM as an integration platform, staff members are now provided with detailed and helpful information. In addition, we are expecting an optimization of internal processes in various fields such as material management, invoicing, accounting, and controlling," says Dipl.-Eng. Maria Elsäßer-Heitz, CEO of Elsäßer Betonwerke, when explaining her decision to introduce the TIM as the company’s central data turntable.

At the beginning of the pilot projects, a sort of master definition was established and formulated, where the following...
questions, based on the collaboration of individual departments, experts, and suppliers of the individual IT systems, were discussed and decided:
1. Which IT systems will be required in the future to efficiently carry out processes?
2. Which system will be the master tool for a certain data range and will supply all other systems with information?
3. What is the shortest and best way for distributing information from one system to all others?
4. What are the most suitable interfaces and technologies to ensure that the data exchange can be accomplished without any loss of information?

Based on the outcomes of these discussions, Precast Software Engineering developed a data flow chart that describes the data flow and the necessary interfaces including the possibilities of implementing them from a technical viewpoint. This concept then also formed the basis for the discussions and resulting specifications for the developers of the ERP systems.

A substantial component of this concept is the introduction of a central data turntable to serve as an integration platform between the systems that is capable of forwarding or providing data to the various formats and different technologies in a process-oriented manner. As an integration platform, the TIM will then make these functionalities available to all its users.

In the following, detailed processes are described that can be reorganized when embedding the TIM integration platform into the new system architecture:

**Starting an order / a project**

Normally, an order is first entered into the ERP system. This initial information consists of the basic data concerning the order and the relevant project partners involved in its execution. A lot of this information, however, is also of concern for CAD system users, as the information is also printed out on layouts, graphs, and diagrams. The TIM now makes it possible to take over a multitude of project information from the ERP system via a web service interface. This information will then be transferred to Planbar. In Planbar, it will then only be required to enter the project with its project name. Subsequently, all further information (e.g. order number, delivery address, architectural data, structural engineering data, etc.) will be imported automatically. Any modification of a project’s basic data can also be transported this way so that the data maintenance of the project in question in the framework of Planbar becomes superfluous.

**Information availability for calculating, accounting, and invoicing**

Calculating, accounting and invoicing precast are complex matters that often differ from one project to another. One the one hand, it is frequently the task of the technical department to know how precast is calculated so that correct information for invoicing purposes can be provided. On the other hand, this information must also be stored and maintained in the ERP system. The TIM makes it possible to precisely transfer such information on projects as a whole, or parts thereof, for invoicing purposes to Planbar. Technicians will then not need to worry about questions as to what was ordered and how individual concrete elements are invoiced. Instead, the technician can simply assign additional pieces of information (e.g. staircase elements for second floor, width 1 metre etc) in Planbar. This will allow all features of the order and individual precast elements (e.g. invoicing acc. to concrete dimensioning, material reinforcement waste 5%, etc.), that were transferred by the ERP system, to be calculated and stored as well. In the course of exporting the data from Planbar to the TIM, users will then once again receive a summary of assigned order items. That is to say, it is not the users that will have to enter this information themselves. Instead, such information on the precast used will be automatically generated and correct quantities (e.g. number of square metres, number of elements, reinforcement installed, etc.) are automatically imported for individual elements via the PXML interface to the TIM and then transferred to the ERP system. This ensures that the invoicing process is as straightforward as possible.
ing parameters provided in the ERP system will be available without any additional manual input.

Availability of material requirement information

Efficient material management requires early and detailed information on material availability for the overall project or individual parts thereof. However, to ensure this, an important prerequisite is that the material requirements of individual precast elements are not transferred to the ERP system as overall aggregate data and figures only, but that the information is forwarded for individual elements. Also, the elements must be assigned to all subsections of the project in accordance with the overall building structure. This process, however, does not only relate to new or modified elements, but also deleted elements must be forwarded to the ERP system to ensure that the required demand for project execution can be exactly determined.

The TIM process system offers the possibility of transferring such data automatically to other IT systems. In the projects described here, for example, a PXML file containing all material-specific information was created after automatically importing the data into the TIM. This also entails that deleted elements are specifically marked and then transferred so that the ERP system receives complete information at all times about the all elements needed, including the required material. After each transfer to the TIM, any modification in the technical planning will automatically result in an updated data export to the ERP system, ensuring that this system is constantly supplied with the latest information. This process will then form the basis for an exact prognosis regarding material requirements and hence ensure optimized ordering, storage, and management.

Availability of facility-specific production data

On the one hand, facility-specific parameters are necessary to correctly carry out the planning of precast elements. On the other hand, companies operating several locations will be striving for maximum overall capacity utilization for their factories and will assign specific production tasks to those facilities that are geographically closest to the construction site. The TIM can provide, with help of its web service interfaces, the possibility of assigning and transferring the planned production site as well as the relevant production date. This information cannot only be used to simulate the production flow and timely stacking procedures, but also for determining whether the precast elements can in reality be produced at the location appearing in the ERP system. The freely configurable Quality Manager makes it possible to define rules that deleted elements are specifically marked and then transferred to the MES can be used for a seamless integration of the PTS (a technology provided by Progress, with whose help machine-related production data for reinforcements can be checked regarding their producibility) to ensure that the necessary reinforcement can be manufactured as well without any problem. This new process concept also allows for the simultaneous generation of data in several formats. For instance, PXML data can be generated with all material management and invoicing information together with the production data in the Uni format to be processed by the MES. This ensures that both the ERP and the MES will receive identical data.

Integrated status management

In the course of its value chain development, the status of a precast element is influenced by several systems. During the technical planning stage, its status, in most cases, is documented only when the element is passed for production, a process that can be carried out, depending on the organizational structure, either in the ERP or in the TIM environment. Further statuses will be shown in the ERP (e.g. production planned, production date defined, delivered, invoiced, etc.), but also during the production process itself (e.g. production started, concreting, production completed, etc.). The TIM can take over the status from different systems via the web service interface and visualize it by means of coloured 3D modelling. This visualization of individual statuses and the project as a whole will provide valuable information on the progress of the overall construction project, in other words, data that contribute their important share for the support of the technical departments or preliminary work organization, project preparation, project management, and logistics. The status management system helps the TIM to determine whether or not modifications in the plans are still possible without the necessity of interaction with other departments and ensures that constantly updated and newest plans have been forwarded and are available to production processes.

Apart from further developing the company-internal products Planbar and TIM in such a fashion that there is sufficient flexibility for different applications, another significant task of the pilot projects consisted in arriving - together with the makers of the ERP systems - at an optimal solution to test the interfaces and to optimize the processes across all systems. To summarize all these endeavours, it can be stated that the incorporation of the TIM integration platform has sustainably improved the overall performance for all staff members involved, no matter if the employee is working in administrative or technical departments or in production and that the information content in all embedded systems has massively increased without any need for manual operation.

FURTHER INFORMATION

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