Flexible Production of Precast Conerete

Udo P. Klein
SÜBA Baufertigteil GmbH
Neustadter Str. 5-7 - D-68766 Hockenheim / Germany

Flexible precasting

In the course of the development of efficient and economical production methods and aiming at the increase of the precasting degree in the precast factory, the SÜBA group started in the eighties to amplify and to complete the already existing production program in order to precast, when requested, complete single-storey or muliple-storey houses in the factory.

Goals of flexible precasting

These once selected methods and types of production and construction are still cultivated and developed by SÜBA with the intention to produce

"precast members and construction modules"

with flexible dimensions, and to increase at the same time the value added real net output in the precast factory, reducing construction periods and construction costs.

The word "precast members" indicates that in future we are going to deliver to our construction sites precast-members, which without after-improvements meet the maximum stage of construction and final stage during assembly, e. g. exterior walls with applied insulating layer and built-in windows, roof panels with insulation and lathing, ceilings with insulation and pipe duct system. "Construction modules" means that several prefabricated precast members" are assembled in the factory into one unit, being amplified and finished further when required – for instance: staircase module and sanitary block module.

Requirement of a flexible precasting

The "precast members" and "construction modules" have to meet the following requirements:

- dimensional precision of the elements within the millimeter-range

- void-free exposed surface of the precast elements (readiness for painting and wallpapering)
- precise pipe duct system for electric cables
- precisely laid and build-in public utility pipes
- modified reinforcement system
- placement of resetting aids for the assembly, e. g. adjustment and resetting aids for walls or ceilings
- exterior walls with assembled windows and doors
- connecting and coupling systems for all installation pipes (wall to, wall to ceilling)

Meeting the abovementioned requirements, SÜBA realizes the objective "econimical construction at a high precasting degree".

Construction and production of flexible precasting

A flexible precasting requires the continuous and product-oriented developement of the existing production plant of SÜBA.

Based on the example of an existing manual pallet circulating system the different steps towards the development of a flexible precasting of

massive ceilings
interior walls without insulation
exterior walls with insulation

will be described.
The starting pint for our idea was the kind of technical processing in the construction department for precast members. The constructional processing of wall and ceiling elements at SÜBA is relized completely with CAD. Severals specially designed programs are used:

- an architectural program for the three-dimensional taking of a building model
- a wall-elementationing program, supporting the breakdown of this building
- model in precast members
- a program for the generation of production drawings for the single elements.

Between the different programs exists a continuous flow of data. This not only economises a lot of processing time, but also ensures the correspondance of planning data in every stage of processing with the final version of execution (elimination of errors).

The generated resetting plans, production drawings and material files are transferred to the operation and process planning department.

The production range is produced on a CAD-CAM-(CIM)-controlled pallet circulating system. All required production data and information are transferred by the control computer and can be used efficiently.

The CAM data based working procedure of the table circulating line with flexible for system for the above mentioned production range is realised as follows:

Track 1: pallet preparation line

station S 1	form removal, pallet converter, pallets are brought to the second level to the pallet cleaning station
station S 2	lifting of the ceilings and walls without insulation tipping station
station S 3	cleaning, oiling and plotting
station S 4-9	formwork with form crane, reinforcement, placement of in-built elements, quality control
station S 10	casting station, compressor station and pallet converter

Track 2: ceilingline (countercurrent)

station S 11	pallet converter
station T 1-5	areas for completion works
station T 6-11	trowelling stations
station S 12	pallet converter

Track 3: wall line without insulation

station S 13	pallet converter
station S 14	pallet converter
station T 12-14	areas for completion woks
station T 15-20	trowelling stations
station S 15	pallet converter

Track 4: wall line with insulation

station S 16	pallet converter
station S 17	areas for pallet maintenance and reconstruction
station S 18 –24	line for window placement and insultion
station S 25	tipping station
station S 26	pallet converter

This modern production procedure implements a specially designed system PPS which drastically reduces the processing time of the elements as well as the conversion periods. Besides, the material flow could be optimized, technical faults occur less frequent (outage time) and quality was improved.

The above described production logistics enable us to produce three-dimensional modules by assembling the "precast members". As a result, the carcases of houses for one or more families can be erected in one day, and after 15 days these economical houses are ready for occupation.