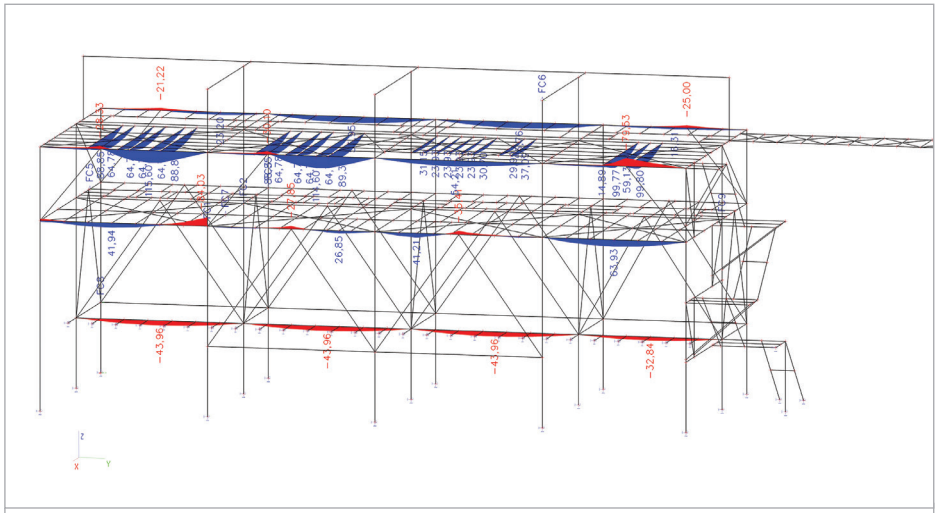
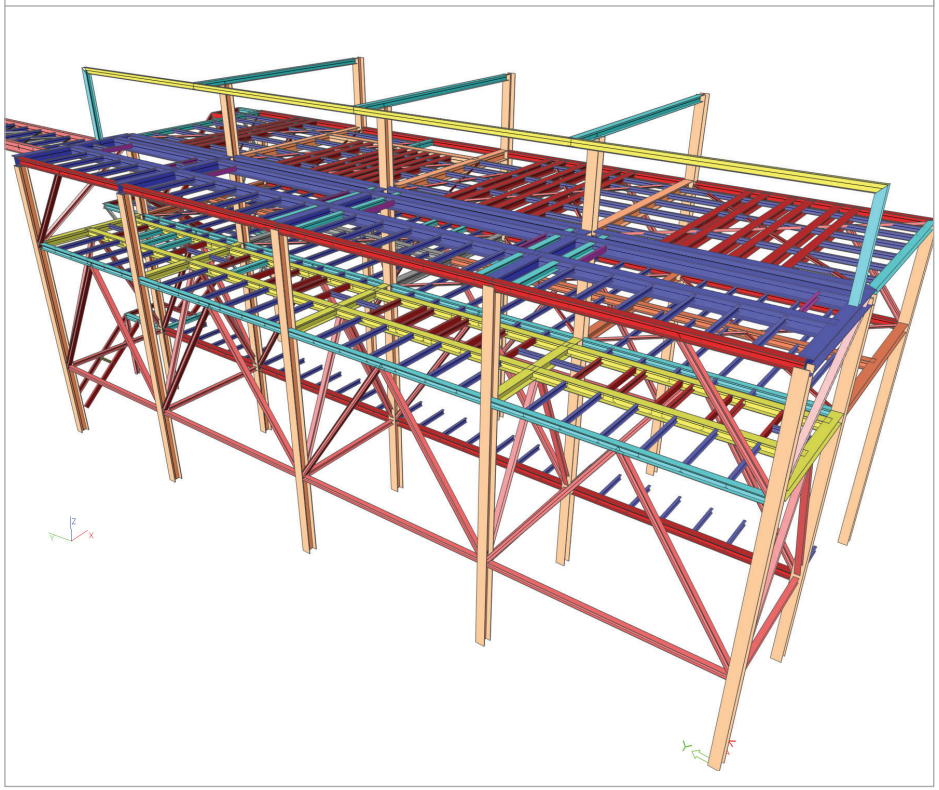
Steel Extrusion Structure - Usak, Turkey





Software: Scia Engineer

The project

This project concerns the construction of a steel structure consisting of five spinning machines.
Spinning machines are machines that process plastic granules into yarn.
This construction consists of three floors: the ground floor, the first floor and the top floor.
The top floor, the extrusion floor, is the floor where the extruders are located, together with the silo with the granules and the spinning beams.
There are different configurations of the spinning beams; for example, one spinning beam with three extruders or one spinning beam with two extruders.
On the first floor there are cabinets which cool down the wires.
On the ground floor the yarn is textured and here you will find the final product.

The assignment

The assignment was to reconstruct the existing installation identically at another location in a seismic area.
The new structure cannot be an exact copy of the existing structure because the existing structure was a building with concrete elevations.
Because of the tight time schedule, the client chose a steel structure instead of a concrete one.
The floor elevations are crucial for the construction and setup of the machine.
The spinning beam, which is provided on the top floor, is placed on a bottom flange of the steel beam.
The top floor has the heaviest load, with the spinning beam, the extruders and the preheating furnace. All floors are covered with checker plate.

Structural system

The design was based on Eurocode standards. The static system of the structure is in the transverse and longitudinal direction stabilised by bracing.

Design software

The static analysis was calculated using a 3D model in Scia Engineer software with linear, non-linear and steel modules.

Foundations

The structural design of the basements was made by a local company based on the outputs of our analysis.

Equipment loads

The equipment load was given by the client.

Structural 3D modelling

The design of the process has been worked out in Scia Engineer. The structure has been completely modelled with 1D beam elements in 3D.
Live, dead and equipment loads have been applied to the load-bearing structure.

The calculation included several steps:

1. A linear calculation using a 3D frame model for the gravity loads (self-weight, dead load, live load, equipment loads.
2. A non-linear calculation using a 3D frame model for the bracings.
3. A check of steel elements using steel module EC 3.

The parameters of the structure were modified step by step according to the technological demands.
The static system of the building is formed by frames with diagonal bracing in transverse and longitudinal bracing and horizontal bracings in the floors.

The system of bracing was active tension diagonal bracings, in which the horizontal forces can be resisted by the tension of diagonals only, neglecting the compression ones.

Conclusion

The project has been successfully completed and will become operational in June 2013.

SPIE - Controlec Engineering

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Established in 1971, throughout the years the company has developed into a renowned EPC contractor for the process industry and energy companies that are familiar with numerous technical disciplines.
From start to finish, we support our clients' implementation of their projects by applying state-of-the-art know-how, years of experience and a flexible approach to projects.
We have specialised engineers in the following fields: process, piping, mechanical, civil/structural, electrical, instrumentation and process control.
Together with other SPIE divisions, we can provide the complete trajectory from conceptual design to building, operationalising and maintenance of E&I and automation.

Project information

Owner	Balta Group
General Contractor	SPIE Belgium
Engineering Office	SPIE-Controlec Engineering
Location	Usak, Turkey
Construction Period	01/2013 to 05/2013

Short description | **Steel Extrusion Structure**

The project is a design of a new steel structure for an existing spinning machine for Baltagroup. The construction is built at the beginning of 2013 in Turkey.
The structure contains five new spinning machines.
The total weight of the structure is about 100 tonnes of steel.
The steel structure should be seismic resistant and the ground floor must be cleared of all obstacles, such as bracings, to generate the texture machine and to handle the finished product.