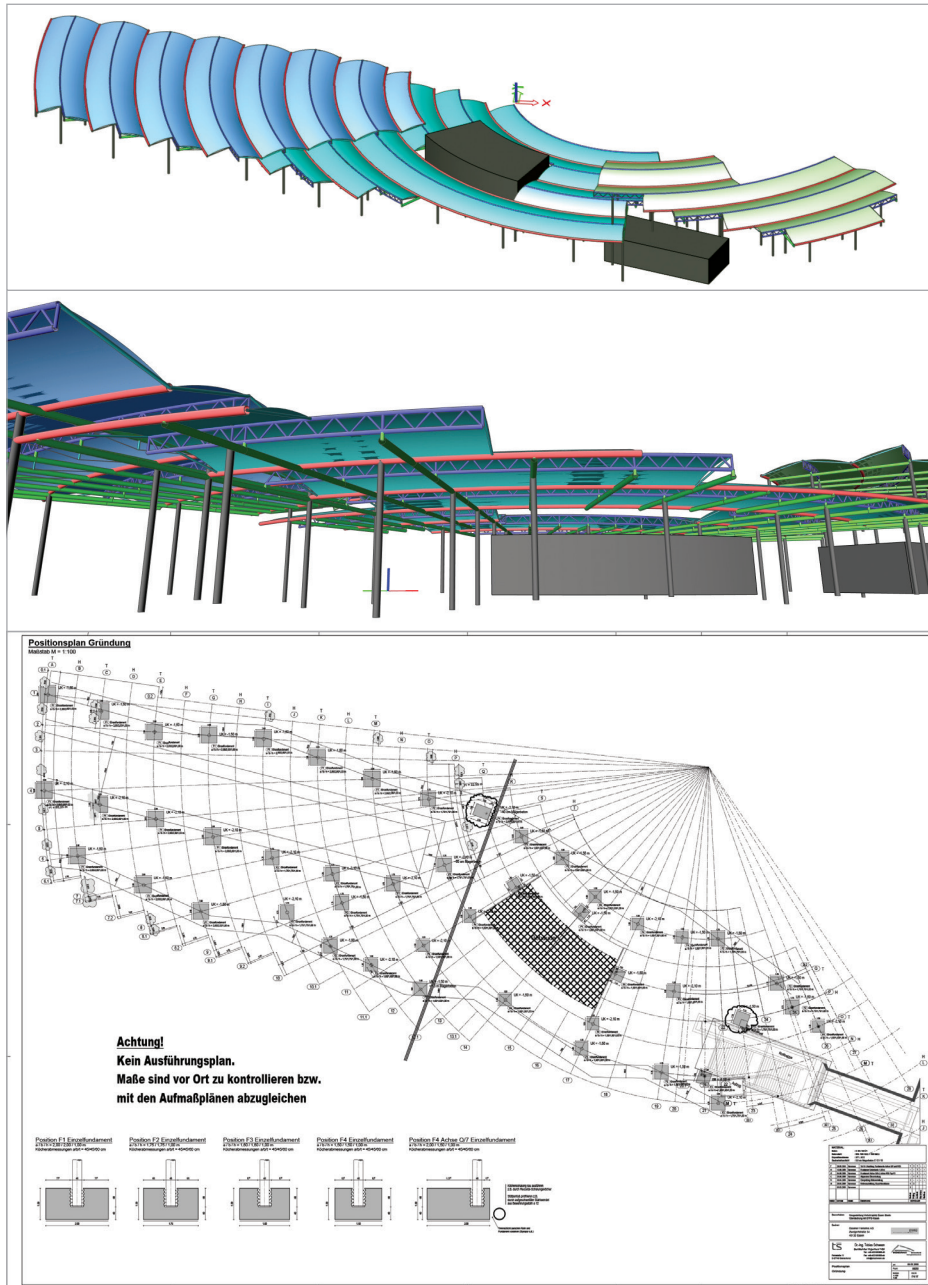


# Redesign of a Traffic Center - Essen, Germany



The 1970s saw the construction of the traffic court in Essen-Steele. It forms one of Essen's main hubs. The concept, developed during the 1970s, to transport 20,000 passengers per day on buses to the central control traffic court, and from there to further destinations by S-train or tram in the city centre, remains valid today. However, after more than 30 years, it was decided that the traffic court should have a makeover. The construction project was planned by the architects of Essen Transport Ltd. (EVAG). It is designed to provide more comfort with modernisation and more accessibility for the disabled. The construction project was started at the end of 2008. The budget was set at 9 million euros. After a year and a half of construction, the revamped facility was launched in August 2010.

Around 20,000 passengers now use the daily continuous entry and exit at all levels to trams, buses and commuter trains. Arrival and departure locations for the trams were designed so that the buses can be reached easily. A generous canopy for the traffic centre, traffic routes and waiting areas was made to ensure a comfortable transition.

Twelve modern breakpoints are now accessible and can be reached in bad weather with dry feet thanks to the new light-flooded roof. The new 3,256 sqm roof construction is made with a vandal-proof and self-cleaning film that has already been utilised in the "Allianz Arena" of FC Bayern Munich. ETFE (ethylene-tetrafluoroethylene) film, first deployed more than 25 years ago, was the best alternative to expensive glass roofing for this project. The roof structure is built at three different heights to allow the use of different means of transport. Thus, the tram area is built to +5.61 m and the bus area is built to +4.50 m reaching to the bottom of the sheet roofing, while the construction reaches to +8.50 m over the existing staircase to the access bridge and the transition to the S-Bahn.

The design is described by concentric curves with sawtooth-shaped transparent foil panels consisting of pneumatically biased, ultra-thin membrane-cushions made of ETFE with a span of 3.5 m. The cushions

were calculated using wire-theory and calculations in the third order for large deformations. There are up to 19 cushions in a row, all supported by radial steel substructures made of circular hollow sections with long trusses in the high points and continuous beams in the low points. The longest truss is 49 m long and 65 cm high with crossbars. The longest support beam is 58 m long. Orthogonal to the radial support elements is an arrangement of crossbeams with partial wire-reinforcement. The crossbeams are supported by steel columns in a non-systematic order to meet the demand for required space for the trams and buses. The columns are grounded on foundations with quivers to absorb the resulting moments.

The entire roof was built around a new massive building containing a ticket sale facility and a kiosk. It was therefore necessary to interrupt the concentric curves of the cushion roof.

Photo material: Fotodesign Andreas Braun, Hameln

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INGENIEURGEMEINSCHAFT  
**Thor - Schipper - Schween**  
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Robert Thor founded his engineering company in Lohne in the north-west of Germany in 1985. It was a reward for his endeavours as an inspection engineer. Building on his experience gained from several years as a senior partner in Bremer, he and his staff planned various major engineering structures and special civil engineering structures.

In 2006, Robert Thor was looking for a partnership to secure the future of his company. Eventually, in 2007, he linked up with Manfred Schipper, an engineer from Oldenburg. Schipper, also an inspection engineer, pursued his profession in Lower Saxony and Mecklenburg-Vorpommern.

Robert Thor was still engaged in a search for a successor for his company in Lohne as Manfred Schipper was to stay as the office head in Oldenburg. Thor and Schipper proceeded to enter into an agreement with 48-year-old inspection engineer Tobias Schween in 2009, forming the firm Thor-Schipper-Schween.

### Project information

|                     |                       |
|---------------------|-----------------------|
| Owner               | Essener Verkehrs AG   |
| Architect           | Essener Verkehrs AG   |
| General Contractor  | Spiekermann           |
| Engineering Office  | Thor-Schipper-Schween |
| Location            | Essen, Germany        |
| Construction Period | 2009 to 2010          |

### Short description | **Redesign of a Traffic Center**

The 3,256 sqm light-flooded roof construction is made with a vandal-proof and self-cleaning ETFE-film similar to that utilised at the "Allianz Arena" of FC Bayern Munich. ETFE-film was first deployed more than 25 years ago and it was the best alternative to expensive glass roofing. The roof structure is built at three different heights describing concentric curves with sawtooth-shaped foil panels consisting of pneumatically biased, ultra-thin membranes made of ETFE on radial steel substructures comprised of circular hollow sections with trusses in the high points and a continuous beam in the low points. Orthogonal to the radial support elements, an arrangement of crossbeams on steel columns supports the construction with foundation quivers.

