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24-hour pumping at Neufahrn: The large-boom team concretes at the motorway junction

On the morning of 4th August, two large-boom concrete pumps arrived at the Neufahrn motorway junction north of Munich – one M 58-5 from Berger Beton and one M 62-6 from BFM Betonförderdienst in Munich.

A sunny, almost autumnal day announces itself with hazy, mild air and single wisps of low cloud. The weather will stay beautiful – perfect for the planned 24-hour concreting that is due to take place today. One notices the men on the construction site are in a good mood – the best prerequisite for starting the work and for the challenging task that lies ahead of them.

Narrow junction at Neufahrn

This structure, which, when viewed from above, looks like a flatly pressed four-leaf clover, can no longer cope with today's traffic volumes. Two national motorways intersect at the Neufahrn junction – the A 9 and the A 92. Along with the Munich motorway ringroad (A 99) and the A 8 Ulm-Munich-Salzburg, the A 9 is the most important north-south route, especially for domestic and international commercial and holiday traffic. The A 92 connects the state capital of Munich with its airport and is also important for Eastern European traffic.

The average volume of traffic from the airport towards Munich is currently approximately 24,000 vehicles in 24 hours. An average daily traffic flow of approximately 38,000 vehicles in 24 hours is predicted for the year 2020. On average, that would be approximately 1,600 vehicles travelling via the Neufahrn junction per hour – not to mention rush-hour traffic.

Large-scale reconstruction is required

In view of this projection, the only option is a speedy connection via the existing motorway junction using a direct ramp. The current single-lane exit via a quadrant of the „clover“ will be completely replaced by a so-called „flyover“ that channels a two-lane carriageway from the A 92 to the A 9 towards the south. The customer is Autobahndirektion Südbayern and the contractor is Hentschke Bau GmbH in Bautzen.

The construction work at the Neufahrn motorway junction commenced in April 2009 with the reconstruction of a connecting ramp and the spillage that is required to build the new bridge, with

110,000 cubic metres of delivered soil. In 2010, comprehensive excavation and ceiling work took place at the Neufahrn motorway junction, as well as bridge construction work in the whole area. The construction project should be complete by the end of 2011.

Flyover concreted in two sections

Back to the concreting at the „flyover“: Dipl.-Ing. (masters in engineering) Felix Raschke, the site manager, explains: „Today, we are concreting section 1 of the ‚Flyover‘“. That is the longer stretch, at 120 m. We started work on the carcass in February of this year and the construction work will continue until October. After that comes the 2nd section – the road section that is 80 m long.“ In answering the question about the particularities of this motorway construction site, he responded saying that the scaffolding work could only be carried out at night. It was extremely important that the motorway was completely closed for this work and the strict compliance with closing times applied here.

Concreting commenced at 6 a.m. Each of the two truck-mounted concrete pumps stands fully-supported at the foot of one of the construction columns within one of the northern clover quadrants of the motorway junction. From this location, they pump concrete to the sites of concrete placement on the approx. 12 m high bridge. Meanwhile, the traffic flows freely on the circular paths of the exits and under the structure.

At the beginning, the end hoses of both booms and the respective machine operator of each concrete pump met in the middle of the bridge construction site. From there, each of them works outwards. The horizontal reach of the large boom is fully utilised. The high level of flexibility of the 6-arm or 5-arm boom was an important criteria for the managing directors of BFM and Berger when they were making the decision for a new large boom. When used together with the sensitive Ergonic® control, the strengths of two booms can be fully utilised in a situation such as this.

The M 62-6 from BFM and the M 58-5 from Berger Beton have the longest horizontal reach of any pumps across Bavaria. With each having fleets of more than forty concrete pumps, both of these companies are among the largest service providers in the state of Bavaria.

In 24 hours, a total of approx. 2,000 m³ of concrete C40/50 was placed with a compressive strength of 42.5 N/mm² (exposition classes XC4, XD1, XF2). This is the quantity of concrete for the entire cross-section of the structure of section 1 including footbridges and carriageway slabs (see the box containing data about the concreting). The complete superstructure (sections 1 and 2) will contain 3,400 m³ of concrete.

So that traffic can ultimately travel on the road comfortably and safely, the finished concrete surface receives another 8 cm thick layer to the overall construction. The concrete is first primed and completely sealed using epoxy resin. An asphalt sheeting (0.5 cm) comes next and then a protective layer of mastic asphalt (3.5 cm thick). Finally, the surface of the road is formed by a 4.0 cm surface layer of stone mastic asphalt.

Technical data of the concrete pumps on site

	M 58-5		M 62-6
Folding type	5-Arm roll-Z-fold		6-Arm roll-Z-fold
Vertical reach	57.6 m		61.1 m
Horizontal reach	53.6 m gross 49.4 m net		57.1 m gross 52.4 m net
Reach depth	42.4 m		44.3 m
Unfolding height	12.3 m		23 m
Delivery line	DN 125, max. 85 bar	Arm 1, 2 Arm 3, 4, 5, 6	DN 125, max. 85 bar DN 117, max. 85 bar
Support width	front / rear		front / rear
normal	approx. 11.1 m / approx. 11.5 m		approx. 12.1 m / approx. 12.3 m
OSS	approx. 8.7 m / approx. 8.0 m		approx. 8.8 m / approx. 8.3 m

Properties of fresh concrete:

Strength class	C40/50	
Exposition classes	XC4	Changing wet and dry (e.g. exterior components with direct exposure to rainfall, components in water tidal zones)
	XD1	Moderate moisture (e.g. components in areas where water may spray from traffic areas)
	XF2	Moderate water saturation with de-icing agents (e.g. concrete components in areas where water may spray from traffic areas that have been treated with de-icing agents)

Steel used:

Untensioned reinforced steel	280 t
Prestressing steel	107 t

Thickness of the layer of placed concrete:

in the area of the webs	2.40 m
in the centre of the carriageway	0.35 cm

Captions:

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1621-4:

The M 62-6 on the north-western ramp at the motorway junction

1621-5:

The pumping duo started the concreting in the centre of the 120 m bridge.

From there, the booms move away from each other as they work.

1621-6:

In a good mood and with everything under control:

Harry Kirchmaier drives the M 62-6 from BFM and Stefan Vogel drives the M 58-5 from Berger

1621-7:

In the middle of the motorway but nevertheless secure: The concreting is carried out quietly while the traffic can flow freely under the bridge construction. This photo shows the M 58-5 on the north-eastern ramp.

1621-8:

To determine the water content, the concrete is heated up until it no longer contains any liquid. The difference in weight can be used to determine the water content.

1621-9:

After a quick clean, the truck mixers rejoin the queue of motorway traffic in order to fetch more concrete