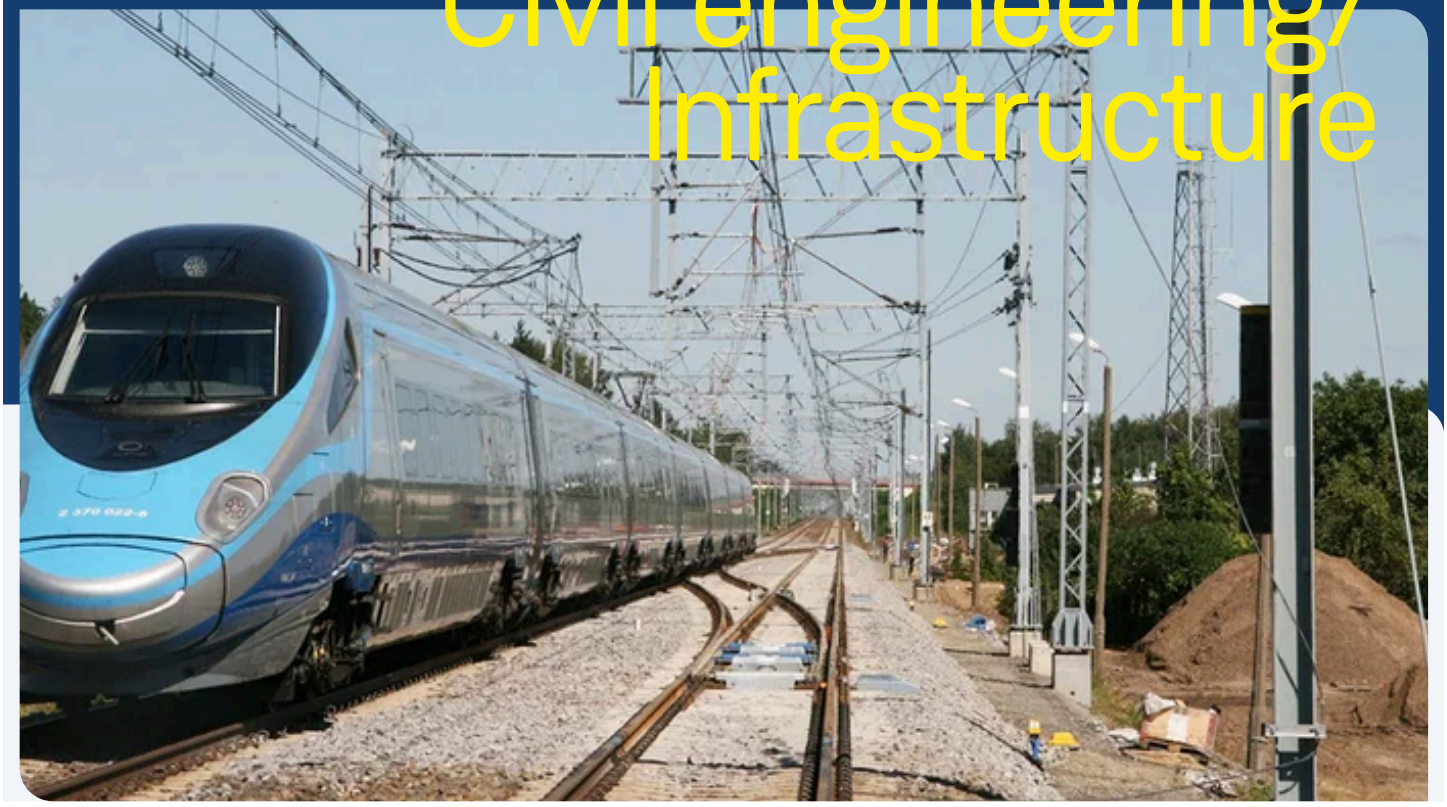
Railway constructions along Poland's central railway

09.11.2018 / Polska / Siegfried Weindok

Civil engineering/ Infrastructure



Factbox

Client: PKP PLK S.A.

Contractor: PORR S.A.

Project Type: Infrastructure, Rail construction

Scope: Extensive track maintenance works; conversion, refurbishment and construction of signal boxes, overhead lines, facilities for safety and control technology, platforms and engineering structures

Contract Volume: EUR 24.8 million

Construction Start: 03/2016

Construction End: 11/2019

In the last two years, PORR has carried out four projects along one of Poland's most important railway lines for the investor PKP PLK S.A.

The first projects involved the conversion of two crossovers, followed by extensive track maintenance works, including regulating the overhead line, along 154km of track. At present, the South Opoczno railway station is undergoing refurbishment.

The Centralna Magistrala Kolejowa CMK, Poland's central railway artery, is a consistently double-track 222km-long railway line connecting the greater Warsaw area with southern Poland. The first section was opened in September 1974. At present, passenger trains travelling along the high-speed line reach speeds of up to 200km/h, while the speed limit for goods trains is 120km/h throughout almost the entire the line. Even higher speed limits are to be achieved by 2020, along with significant reductions in travel times, as part of the project "Modernisation of railway line no 4 – the central rail artery".

> The fourth order on this important route is a true vote of confidence from the client. We score with quality.
>
> **Siegfried Weindok**
> Member of board PORR S.A.

Refurbishment of the crossover

Transporting the switch blocks. Image: PORR AG

The contract for the complete refurbishment of the Biała Rawska crossover was awarded in March 2016 and represents the starting point for several years of successful collaboration between PKP PLK and PORR. To carry out this project, the CMK line was completely closed for six days for the first time in its history. As the CMK is the main passenger line in Poland, the works were subjected to severe scrutiny from the investor, the media and an interested public. The greatest challenge lay in completing all the track and sub-ballast works, setting up the control and control technology and re-laying the electrical wiring system within the short full track closure period. Even the slightest overrun would have resulted in a high penalty. Another challenge lay in the use of Track System technology for laying rails and installing switches in sections. This technology, which had not been used in Poland before, uses switch systems that are pre-assembled by the manufacturers and delivered as switch blocks.

Extensive preparations

Prior to the six-day track closure period, the foundations for the new structures supporting the overhead lines were created, the sleepers were installed next to the existing tracks and the pre-assembled switches were acquired from the manufacturer Voestalpine in Austria. Preparations were also made for demolishing the old foundations of the supporting structures for the overhead line system.

A logistical tour de force

The works during the track closure period began with dismantling the point mechanisms, the facilities for safety and control technology, the overhead lines, the old supporting structures and the pile foundations. After the overhead lines had been dismantled, work began on removing the existing switches and tracks with a KRC 1200 railway crane. A replacement crane was available on standby in case of breakdowns. The old track ballast was removed, the sub-ballast was profiled and compacted, and technical and geo-technical surveys were carried out while the sleepers were still being dismantled. Dismantling the tracks took a total of seven hours, and another 16 hours were needed to clear and remove the old ballast. Once the track had been dismantled, the old sleepers were transported to the adjacent station in low-floor vehicles. Freight carriages carrying the new switch systems were then driven onto the line. After the carriages had been manoeuvred from the transport position to the unloading position, work began on installing the missing track sections. The base course was laid, compacted and levelled while the old ballast was still being removed and the profiling works on the sub-ballast were being carried out. Installing the base course took a total of 19 hours and 13 hours were needed to complete the ballast plane. Once the ballast plane had been created, work began on installing the track frame and the switch systems. This was completed in 25 hours.

Due to the short track closure period, two tamping machines and two ballast regulators were used to tamp the ballast. A total of 45 hopper wagons were used for filling the tracks with ballast. The filling and tamping processes took a total of 23 hours. Over the next ten hours, the installation works for the new overhead lines, including regulation, the welding works, installing the technical control and safety facilities and the hydraulic drive connections, and the operational inspections were all carried out. Thanks to the preparatory works, the work technology employed and the exact planning of every step of the workflow, the stipulated service time plan was met, and the railway line was handed over to the employer in October 2016.

Further contracts

The successful completion of the project meant that PORR was awarded further contracts along the central railway artery by PKP PLK. These included a direct follow-up contract, i.e. the conversion of the Pilichowice crossover, which followed the plans and sequences of the previous project and was also successfully completed within the stipulated time frame, from March to October 2017. While these works were still underway, PORR's third project on the CMK was launched in August 2017. Approximately 55,000t of track ballast were added, 160km of track and 16 switches were tamped and 160km of overhead lines were regulated on the 80km section between Grodzisk Mazowiecki and Idzikowice within three months. The logistics involved in this contract were particularly challenging, as all the work had to take place at night, during the eight-hour track closure periods, and within 72 days. The fourth project on the CMK is currently being implemented. This contract involves replacing 16 switches at the Opoczno station, including 12 high-speed EW1200 switches, and 5km of track, as well as the construction of a new electronic signal box. In addition to this, the overhead lines are to be upgraded, and a new platform and pedestrian underpass built. The project began in May 2017 and is scheduled for completion in November 2019.

A train passing along the refurbished tracks at the Biała Rawska crossover. Image: PORR AG

Technical data

Projects 1 & 2: Conversion of the Biała Rawska/Pilichowice crossovers

- complete replacement of the tracks along sections of over 600m length per project
- complete replacement of 4 switch systems with movable centres for speeds of V=250km/h per project
- demolition and construction of one new electronic signal box per project, including installation of the external and internal equipment
- construction of one aerial tower per project conversion of the overhead lines including supporting structures
- construction of technical control and safety facilities

Project 3: Track works along the section Grodzisk Mazowiecki – Idzikowice

- track tamping and ballast filling works along a total of 154km of track
- mechanical ballast cleaning, including track tamping and profiling along the liquidated railway crossings
- regulation of the signal system
- dismantling and reinstallation of the technical control and safety facilities

Project 4: Refurbishment of the South Opoczno railway station

- complete conversion of lines 3 and 4 along a total length of 2,343m
- replacement of lines 1 and 2 along a total length of 1,847m
- construction of a 300m-long platform construction of an electronic signal box construction of a storage and social infrastructure building
- conversion of 3 engineering structures
- conversion of the overhead lines and the technical control and safety facilities

Summary

Since March 2016, PORR has successfully completed three projects within the scope of the project “Modernisation of railway line no 4 – the central rail artery”, and a fourth project is currently underway. The fact that PKP PLK has awarded PORR multiple contracts on this prestigious railway line is an impressive testimony to PORR’s achievements in carrying out the complex works to the employer’s complete satisfaction, despite the tight scheduling.