



Job Report Cold Recycling

WR 2500 S: Cold in place recycling, Yingda Road, Yingkou, China





Wirtgen Cold Recycling:

WR 2500 S: Cold in place recycling with bitumen emulsion and cement Yingda Road, Yingkou/Liaoning Province

Mike Yu, July 2004

Background information

This cold recycling project on Yingda road is one of the first large scale cold recycling projects applying bitumen emulsion and cement. Considering that this is a heavily trafficked road, this project has a significant impact on the development of the cold recycling technology for high grade roads in China. The contractor of this project was the Liaoning Transportation Department which is the government office of the province. This department is in charge of the road building and rehabilitation operations in the province.

The decision to apply bitumen emulsion is due to the low temperatures during the harsh winters in this Northern

province. The application of bitumen emulsion ensures a higher flexibility of the base course and reduces the possibility of future road damages through cracking.

The Liaoning Transportation Department appreciates the strengths of cold recycling in this particular area and is a forerunner in the application of cold recycling in this region.

Yingda road which connects Yingkou and Dashiqiao is 18.77 km long and 23 meters wide. The road was built in 1975 and has been rebuilt 5 times over the last 30 years.

The current traffic flow is about 15,000 vehicles per day and 50 % of this number are heavy trucks.



The condition of the old road before the rehabilitation with cold recycling.



A specimen of the old road structure is necessary to determine the new mix design.

Road structure

- 4 cm hot mix wearing course
- 3 cm hot mix concrete
- 4 cm large size aggregate hot mix
- 3 cm large size aggregate hot mix

Road distress

- Alligator cracking and pot holes.
- The primary road structure varies a lot.
- The road drive performance decreases.
- The slow lane base has a poor stability.

Mix design

Since this is one of the first large cold recycling projects in China and the first cold recycling job in Northern China, the contractor tested different mix designs and construction methods at the beginning. With the start of the actual trial section, the contractor finally applied the following mix design for the main area:

- 10 %: 0–5 mm crushed material
- 15 %: 10–30 mm crushed stone
- 4.2 % emulsion (55 % bitumen concentrate in the emulsion)
- 1.0 %–1.5 % cement
- 1.0 %–2.0 % water

Sieve analysis

75 % RAP + 25 % crushed material

Sieve size (mm)	31.5	19.0	16.0	13.2	9.5	4.75	2.36	1.18	0.6	0.3	0.15	0.075
Percent passing	100	96	88	85	71	49	34	23	12	8	5	2

The construction process

The total recycling area consisted of approximately 430,000 square meters; the job was carried out by two subcontractors: the Sanxing Road Construction Company and the Yingkou Road DOT. Both used the high performance cold recycler Wirtgen WR 2500 S. The job started in May 2004 and was terminated in August 2004.

The following equipment was used:

A Wirtgen WR 2500 S cold recycler, two emulsion tankers, two water tankers, a Hamm 18 t single-drum roller with vibration, a Hamm double-drum roller with vibration, a Hamm pneumatic tyred roller and a grader.

- Working speed: 6 – 8 m / min
- Recycling depth: 15 cm



The all-wheel driven WR 2500 S is equipped with an injection system for both hydraulic and bituminous binding agents.



The cold recycling train with the WR 2500 S during the construction process.

Due to the excellent organization of the jobsite, a daily performance of 7000 square meters could be achieved.

Overlays and final results

Overlay on top:

- 5 cm AC20 as binding course
- 4 cm SMA13 as wearing course

Conclusion

- One of the first large scale cold recycling projects with bitumen emulsion in China was carried out successfully.
- The contractor, the Liaoning Transportation Department, was very satisfied with the application results and will investigate more research projects integrating cold recycling technology, e.g. plant mix cold recycling.
- The reference project attracted a lot of interest from potential customers in Northern China.



The final surface after the last surfacing process.



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