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Chip Seal - Development of highly modified emulsion in Austria

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Austrian Road market and topology

- The Austrian market for road surface maintenance is mainly achieved through hot asphalt mix. A dense network of asphalt plant is spread over the country
- Nevertheless for federal and local road the surface dressing and slurry seal technologies are well known and practices.
- The country between Switzerlzand , Germany and Italy is covered by highest european mountains areas: the Alp region

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Climate and road network

- The climate is continental: hot summer and very strong winter periode; heavy snowfalls in the mountains; the binders should have both resistance at high and low temperature, assessed in term of ring and ball and Fraass point

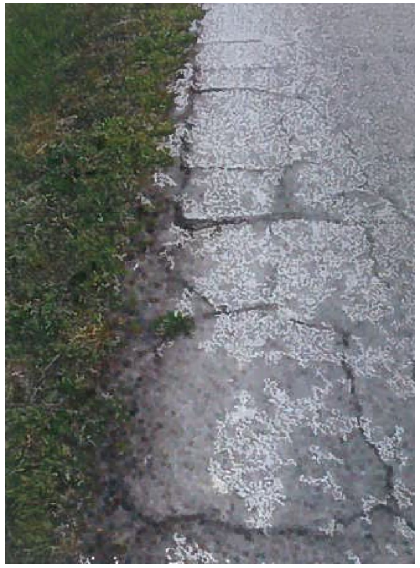
The very strong economy indicators are linked with a tremendous increase of the traffic during last decades. Because of the Alp mountains area, and many beautiful touristic sites, Austria is a very attractive place, and skiing is a traditional activity

- This Creates high stresses and possible early defect on the chip seal ;

Existing light pavement structure

- We encounter often steep slopes, curves, SUV vehicles on light structure

- This Creates high stress and possible early degradation damages of the chip seal ; we are expecting good adhesivity between aggregates and binder coupled with high cohesion and elasticity



Development of colflex ultra

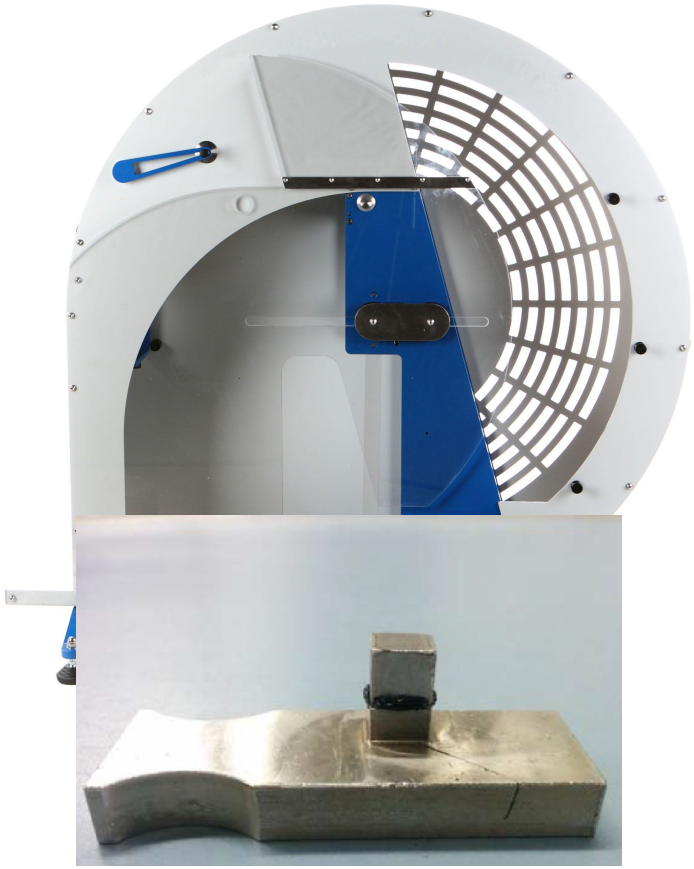
- High concentration of binder: nearly 71%
- High polymer content: more than 5%

Resulting in

- High elasticity, high cohesion
- High viscosity ensuring no leakage, and preventing from excessive bleeding

COLFLEX ULTRA: High performance emulsion

- Following European standard EN13808 this cationic emulsion classified (C 71 BP 3 – OB), is a rapid breaking emulsion with high amount of polymers.
- It's main characteristics are a high cohesion value > 1,4 J/cm² and a better softening point > 57 °C. Pendulum test according EN 13588:2017 measures the cohesion value on a film between two part of cubic form in term of energy in Joule by cm2 at a temperature range from minus 10 to plus 70°C. Value found by assessment by third party 1,71 and 72,6



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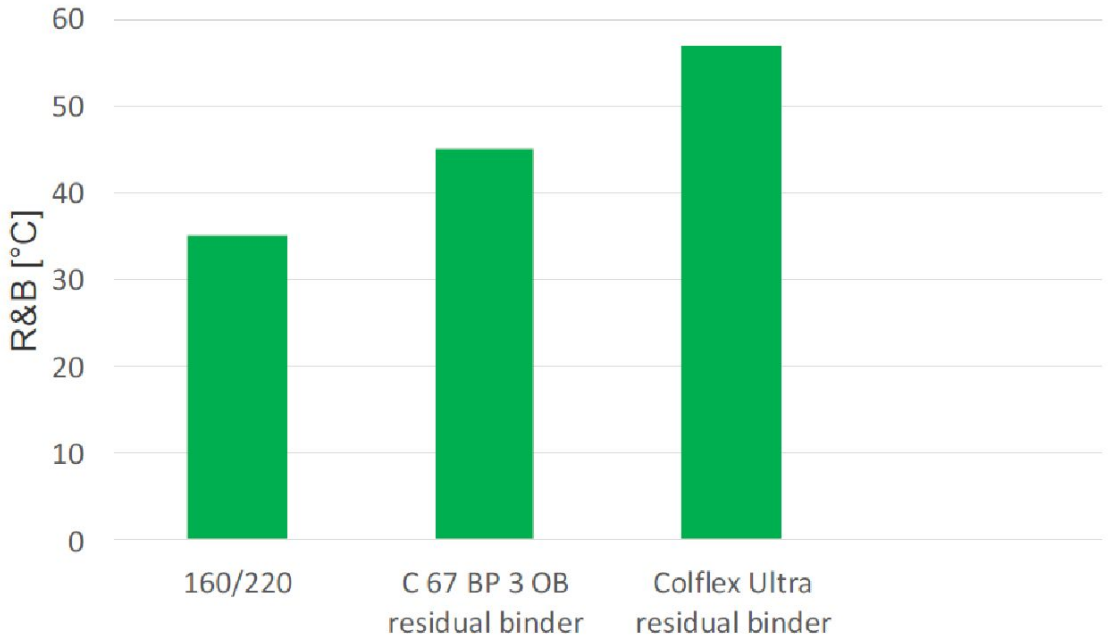
COLFLEX ULTRA properties

- for this binder the R&B value is around 60°C (57 to 63°C): compared to pure bitumen the softening point value increased by approximately 25°C.
- Elastic recovery is close to 80%
- Fraass lower temperature breaking point is around minus 20°C
- Adhesivity on aggregate is 100%



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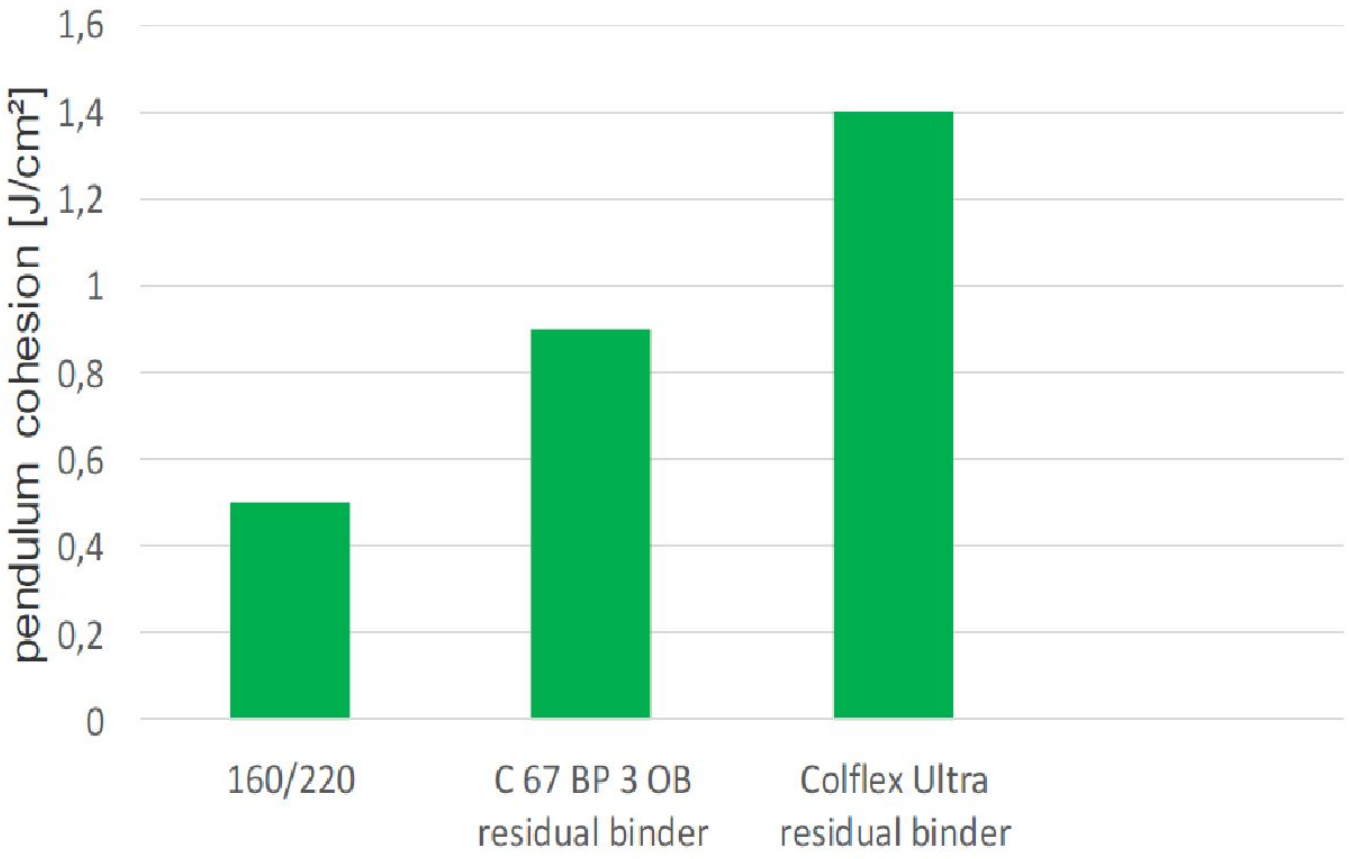
Properties: Pendulum cohesion >1,4J/cm2

For bituminous emulsion the test is performed on residual bitumen after breaking of the emulsion and evaporation of the water phase. The chart beside gives the maximum value of cohesion.
The figures shows that the cohesion for a pure bitumen is around 0,5 , for current modified emulsion 0,9 and for Colflex Ultra the value reach 1,4 J/cm2



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Advantages to chip seal with this highly modified emulsion

- Give better resistance to shear stress encountered in curves and slopes: due to high cohesion: no damages were noticed
- Prevents reoccurrence of cracks and bleeding from existing roads: the elastic behavior is enhanced and the softening in hot summer time is minimized
- Lifetime extension expected

Section test and sites

- In summer 2017 more than 37.000 m² of single surface dressings have been made in Lower Austria, and in Styria.

Combined gritter sprayer

Chipping shortly after spraying

Evaluation of the elastic behavior

Behavior 1 month after applying

Conclusions

Development of highly modified emulsion is perfectly matching the market characterized by a quick increase of trafic with new type of vehicles SUV, 4 wheels, electric cars riding in specific road with many curves and steer slope located in mountain areas with cold and snowy climate.

Even the market is not that huge the performance and lack of default of the type of chip seal creates a quick demand for that type of binder in many municipalities.

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