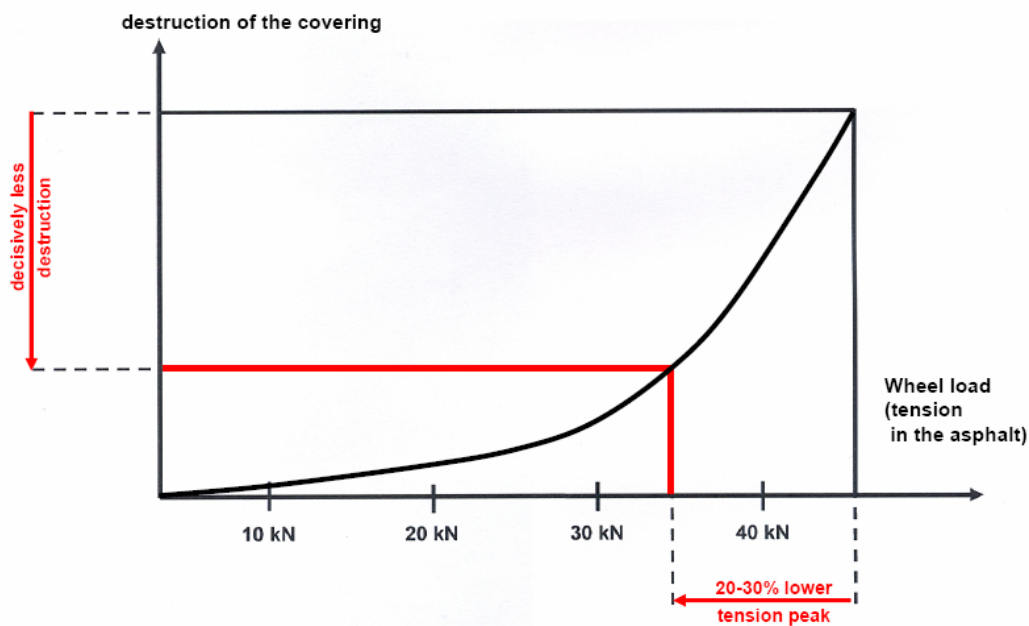


Graphic 20: Resulting stresses in the top asphalt in a model with six vertical cracks (crack length 0.06 m) because of the expansion of the water enclosed in the crack (existing asphalt)

## 12. Summary

The pre-bituminised carbon-fibre reinforcement reduces expansion in all the tested temperature and load ranges and thus reduces stress in the asphalt layer by approx. 30 %. Carbon fibre grids as well as glass-fibre grids are used to reduce cracks in the asphalt layer. Both reinforcement grids increase durability. The carbon fibre grid additionally improves the structure value.



Graphic 21: Impact of wheel load on pavement layer destruction

Graphic 21 shows that the damage to the asphalt pavement increases in proportion to the wheel loading. The carbon-fibre grid reduces the stress peaks caused by wheel loads acting on the bituminous pavement layer. The destruction of the layer is thus reduced significantly. This is demonstrated by higher durability, prolonged replacement cycles as well as reduced maintenance. Thanks to reduced traffic congestion there are additional economic benefits. Taking all aspects into account the cost advantages delivered by reinforced asphalt pavement layers are relevant.

### **13. Reference literature**

- Different Test reports EMPA, Dübendorf, Switzerland
- Inquiry report by Netherlands Pavement Consultants bv, NPC Nr. 018463
- Test report by Centre de recherches routières Bruxelles Belgique, EP 61530
- Test report by Consultest, Ohringen Switzerland, 1119-02
- Test report by SACR, autumn 2003
- Modelling by Dr. Andrew Faeh, Ingenieurbureau Heierli AG, Zürich, Switzerland