

**Zeitschrift:** IABSE reports = Rapports AIPC = IVBH Berichte  
**Band:** 83 (1999)  
  
**Artikel:** Early-age-crack control: a case story  
**Autor:** Jensen, Henrik Elgaard / Christoffersen, Jens / Engstrøm, Villads  
**DOI:** <https://doi.org/10.5169/seals-62950>

### **Nutzungsbedingungen**

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. [Mehr erfahren](#)

### **Conditions d'utilisation**

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. [En savoir plus](#)

### **Terms of use**

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. [Find out more](#)

**Download PDF:** 22.07.2025

**ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>**



### Early-Age-Crack Control: A Case Story

**Henrik Elgaard JENSEN**  
Civil Engineer, PhD  
COWI Consulting  
Copenhagen , Denmark

Henrik Elgaard Jensen received his MSc and PhD from the Technical University of Denmark

**Jens CHRISTOFFERSEN**  
Civil Engineer, PhD  
COWI Consulting  
Copenhagen , Denmark

Jens Christoffersen received his MSc and PhD from the Technical University of Denmark

**Villads ENGSTRØM**  
Civil Engineer  
COWI Consulting  
Copenhagen, Denmark

Villads Engstrøm received his MSc from the Technical University of Denmark

### Summary

Increased demands to achieve durable concrete structures with increasingly longer service life requires more detailed investigations and knowledge of e.g. potential chloride ingress or risk of cracking in the concrete due to heat generation during hardening and/or shrinkage. In the last 10-20 years concrete mixes have moved towards more dense concrete to obtain high resistance to chloride ingress. As the concrete becomes more dense the concrete mechanical properties change and often the risk of cracking increases, which consequently can reduce the durability of the structure. In other words durable concrete can under improper use cause non-durable structures.

By means of computer simulations of the hydration temperature and the temperature induced stresses it is possible to predict the risk of cracking and to determine appropriate measures to reduce the risk of cracking. It is possible during planning of massive concrete castings to minimise the preventive measures required to reduce the risk of early age cracking such as cooling.

This paper will be based on three case stories from the Great Belt Link and The Oresund Link projects in Denmark, which demonstrates that the potential crack risk can be simulated quite accurately. Based on three dimensional simulations the importance of the static boundary conditions are discussed and it will be demonstrated that under certain circumstances it is impossible to avoid early age cracking due to the effect of autogeneous shrinkage.

## Conclusions

Based upon the presented case stories we find that the following statements can be raised.

1. 3D dimensional analyses will be required in the future. A lot of assumptions regarding static boundary conditions can be calculated instead of being assumed.
2. Single cooling pipes do not have to be modelled in relation to evaluation of global effects. This approach is equivalent to concrete design where the single reinforcement bar is often not modelled.
3. Prediction of potential crack risk can be calculated very accurately if all information is known. It is very important before any calculations are started or required as documentation, that acceptance criteria and input parameters are agreed.
4. To avoid the problems mentioned in 3 a guide or code of practice in relation to computer simulations of early age crack risk is needed.
5. By performing preliminary evaluations of the crack risk, cost can be reduced e.g. by avoiding expansion joints in some structures.