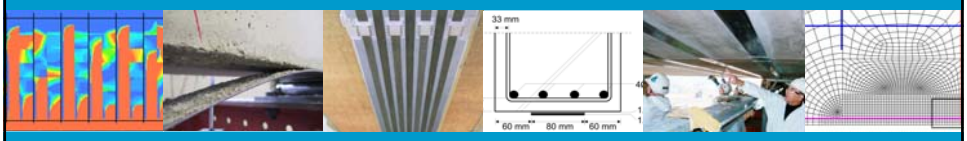
Externally bonded Carbon Fibre Reinforced Polymers



DIANA ontwikkelings Vereniging, 31 oktober 2006
Reinier Ringers

1

Bouwdienst Rijkswaterstaat

TU Delft
Delft University of Technology

Inhoud

Toepassing koolstofvezelwapening
Opzet onderzoek
- Bezwijkmechanismen
- Gedrag bij dwarskrachtscheuren

Modelering in DIANA
Resultaten uit DIANA
Voortgang onderzoek en conclusies

2

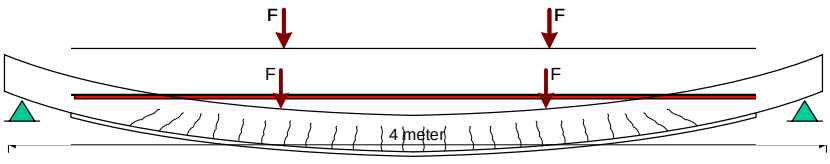
Bouwdienst Rijkswaterstaat

TU Delft
Delft University of Technology

Introductie

3

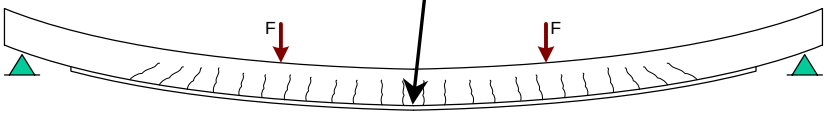
Opzet onderzoek



4

Volledige composiet werking

Uiterste grens toestand
- Staal wapening vloeit
- Koolstofvezel bezwijkt op trek



CUR 91

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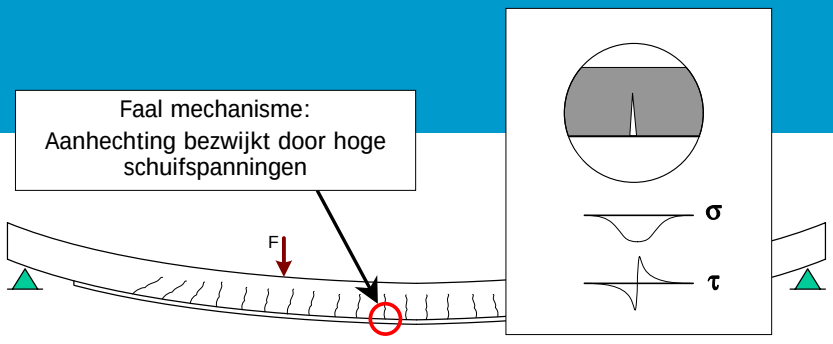
Onthechtingsmechanismen

Faal mechanisme:
Aanhechting bezwijkt door hoge schuifspanningen



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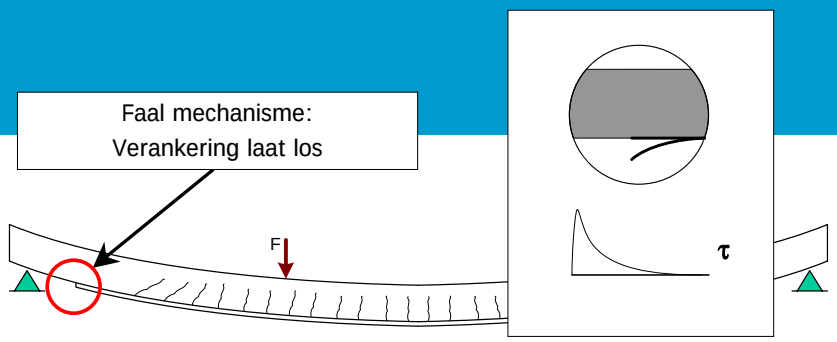
Onthechtingsmechanismen



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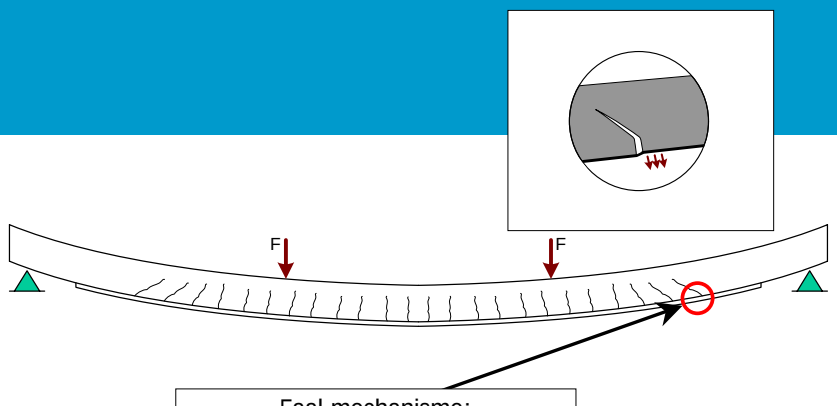
Onthechtingsmechanismen



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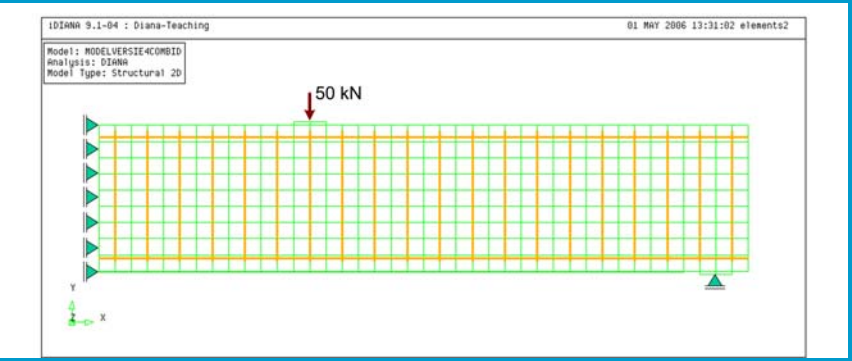
DIANA model



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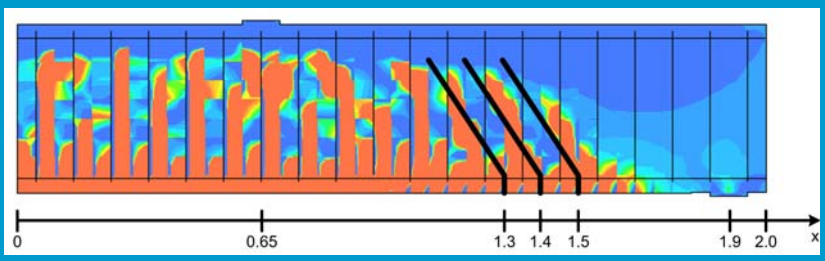
DIANA model



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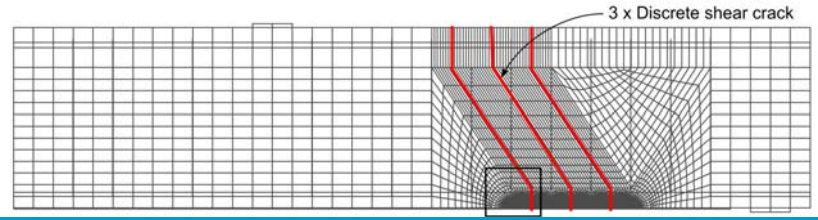
DIANA model

- Vlakspannings elementen: CQ16M
- Interface elementen: CL12I
- Beton: Mohr-Coulomb vloeicriterium
- Tension softening en Tension cut-off toegepast



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DIANA model

- Uit experimenten blijkt dat onthechting ontstaat net boven de lijmlaag

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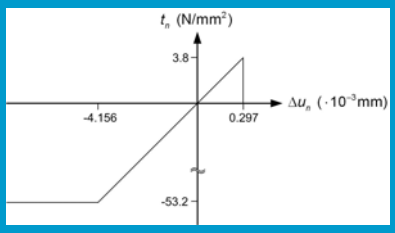
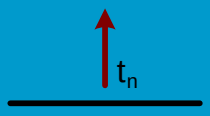
DIANA model

- SIGDIS en TAUDIS relatie toegepast:





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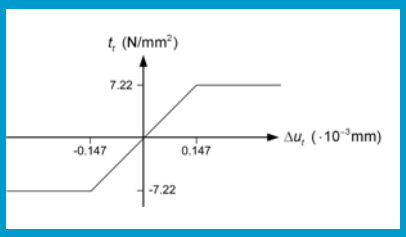
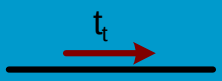
DIANA model

- SIGDIS en TAUDIS relatie toegepast:





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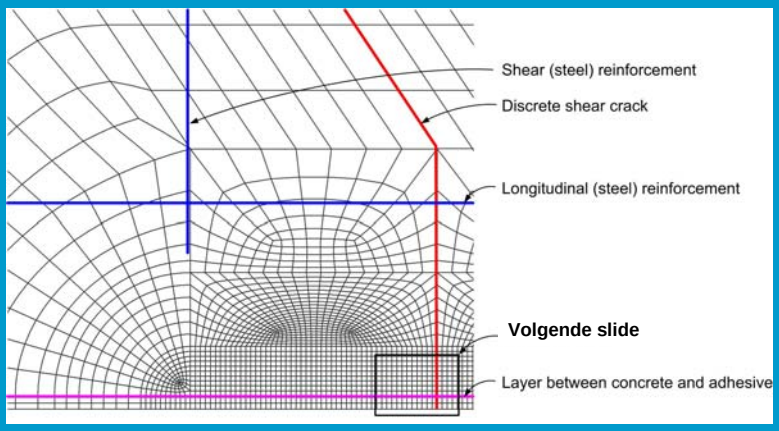
DIANA model



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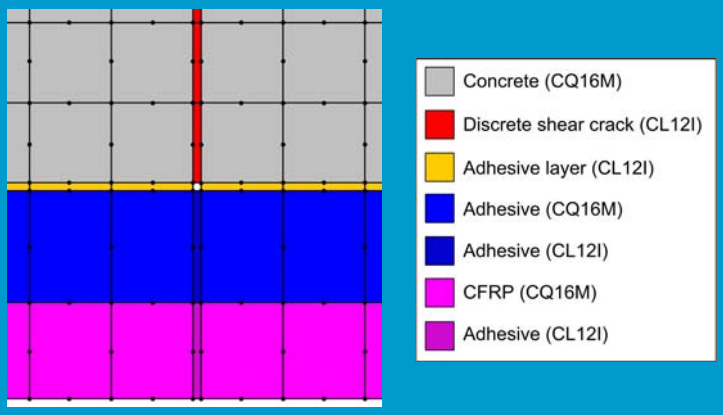
DIANA model



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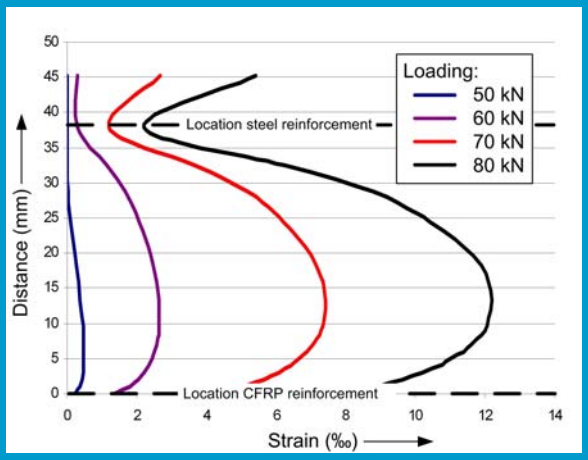
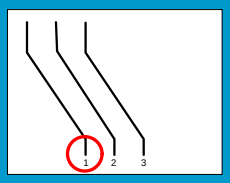
DIANA resultaten





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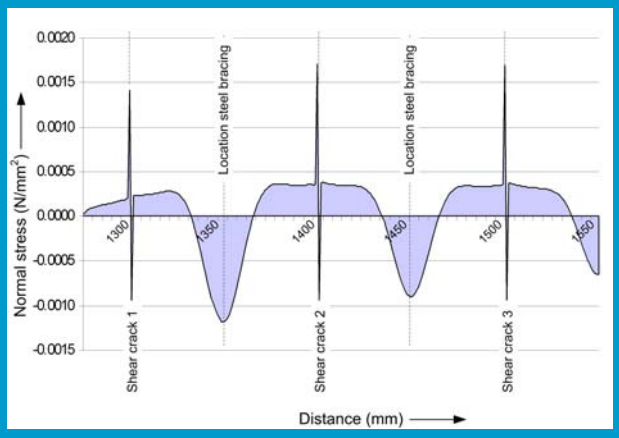
TUDelft

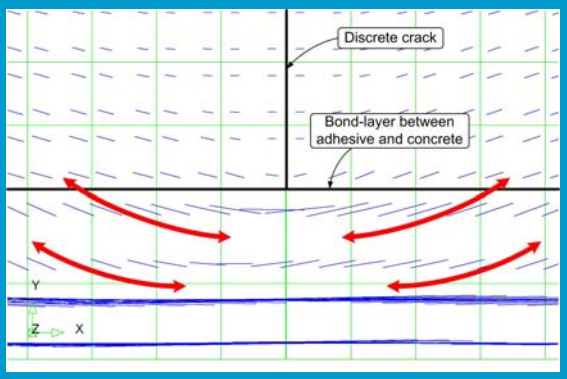
DIANA resultaten

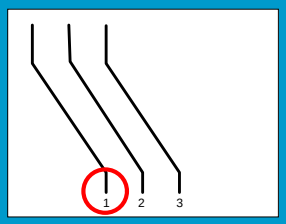


18

TUDelft

DIANA resultaten





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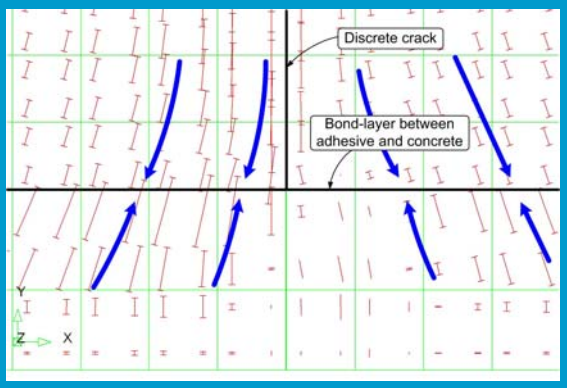
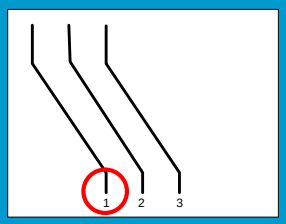
DIANA resultaten





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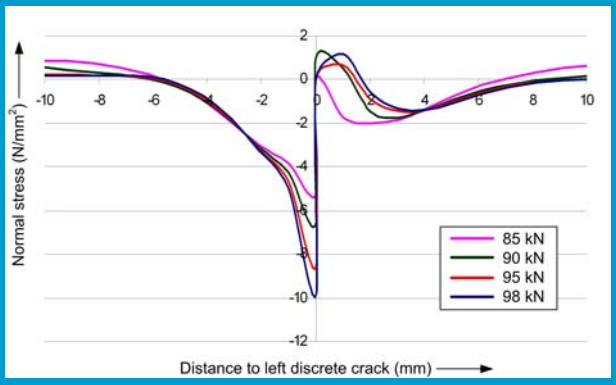

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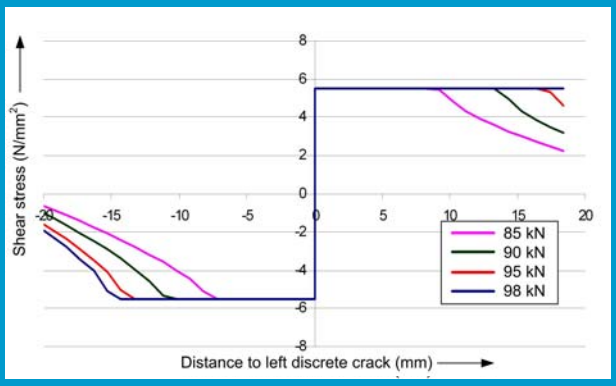

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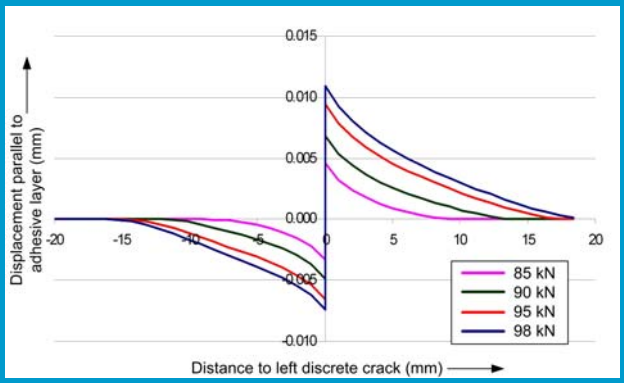

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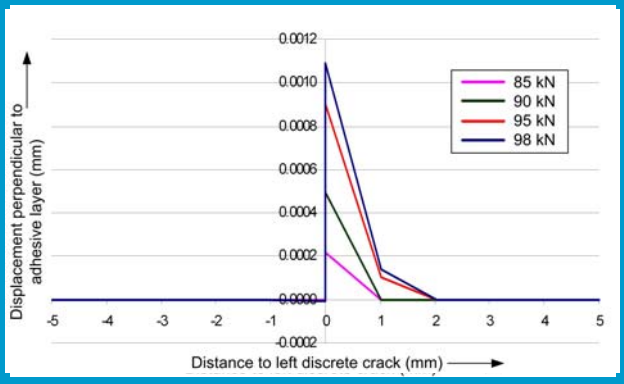

Voortgang en conclusies

Onderzoek is nog niet afgerond:

- Parameterstudie, vooral de eigenschappen van de lijmlaag

Conclusie:

- In eerste instantie ontstaan geen trekspanningen rechts van de dwarskrachtscheur, waardoor onthechting niet direct optreedt. Pas in een verder stadium ontwikkelen zich trekspanningen die uiteindelijk leiden tot onthechting.
- Meerdere dwarskrachtscheuren lijkt geen invloed te hebben op het bezwijkmechanisme.

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Vragen?

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