

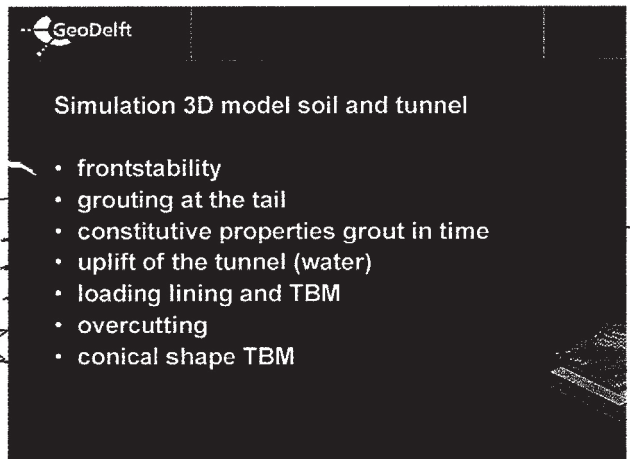
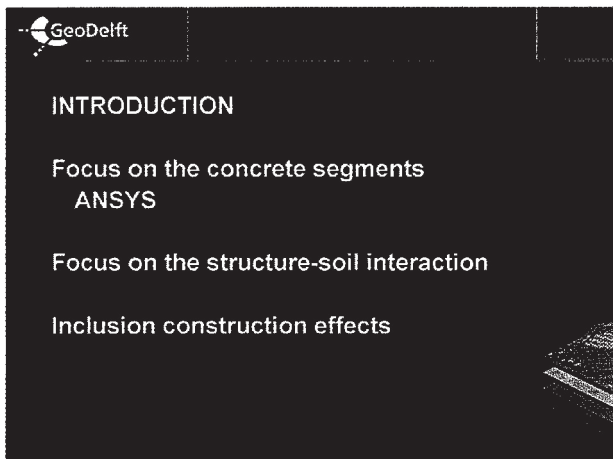
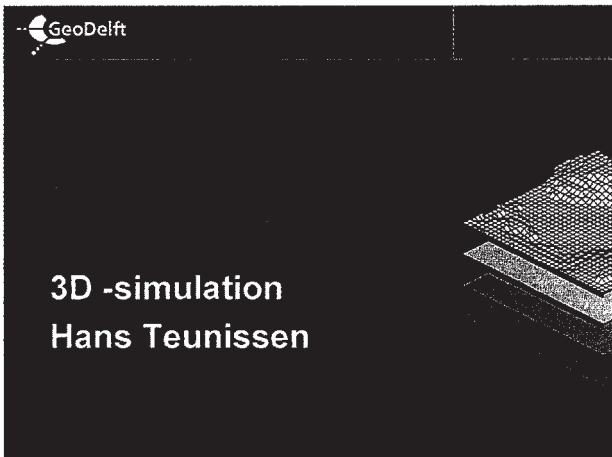


**3D-simulatie grond &
tunnel met het Pluto
convectiemodel
Boortunnel Groene Hart
Voorlopige resultaten 19-12-2000**

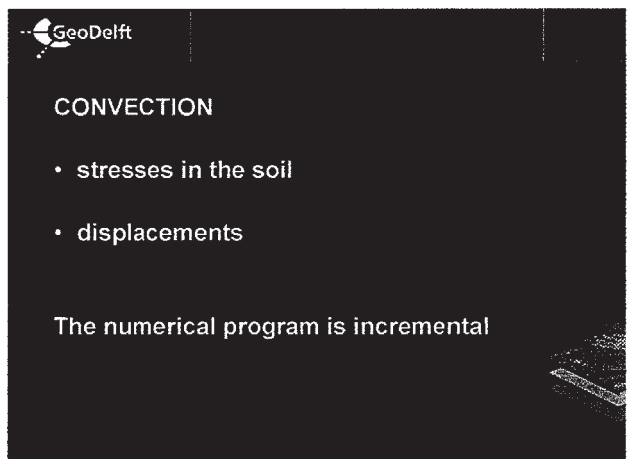
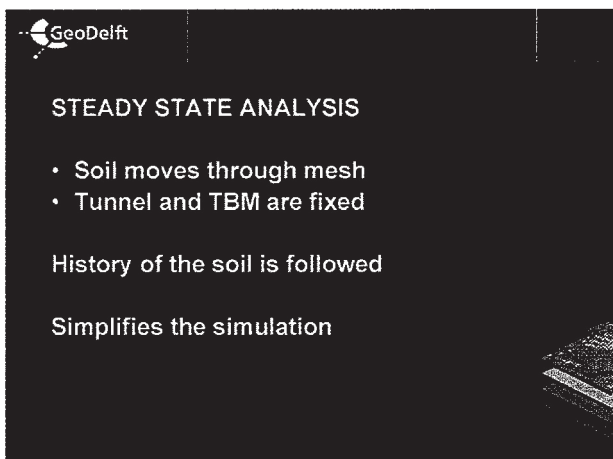
Datum 19 december 2000
Status Voorlopig, tbv interne HSL presentatie

Opgesteld door Hans Teunissen

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ontwerp\TEKST\voorblad.doc



Handwritten note: niet megenomien.




GeoDelft

Section 28.000 km


In the soil profile are two soft top layers below is sand

Soil layer	Top level (m NAP)	Adv. (kN/m ³)	Thick. (m)	E _s (kN/m ²)
12	-12	13.2	13.2	0.667
6	-6.0	14.6	14.6	0.667
22	-12.0	18.1	20.1	0.5
34	-25.0	18.4	20.4	0.5
38	-36.0	18.1	20.1	0.5




GeoDelft

TBM AND LINING



12 24 16 12 36 18

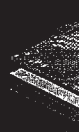
in front 34 m is modelled



GeoDelft

STAGED CONSTRUCTION

- 1 weight soil
- 2 lining stiffness and weight + front
- 3 porepressure lining + TBM
- 4 TBM stiffness + weight +front
- 5 loading constructions
- 6 grout pressure
- 7 convection
- 8 few steps no convection




GeoDelft

USED GEOMETRY

8-noded volume elements for the soil

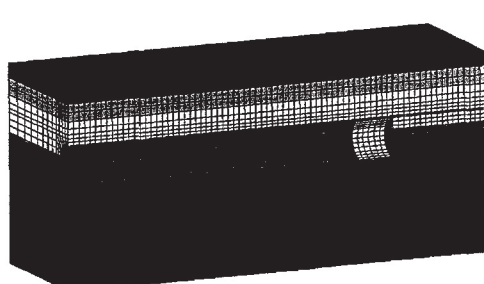
4 noded Reissner-Mindlin shell elements for TBM and lining



Grout volledig 3D op de lining! Piekspanningen bij injectie punten.
 → einde mesh ⇒ grond drukken?

GeoDelft

FDNV 5.2-02-A 660917C 10 DEC 2009

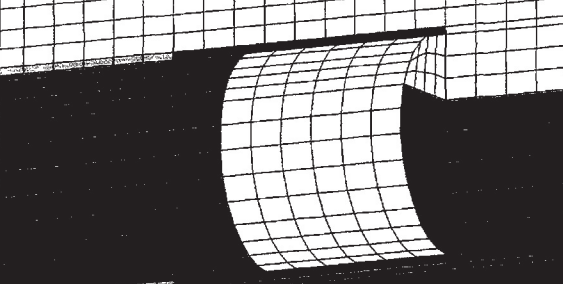


MODEL TIME

z
y
x

GeoDelft

FDNV 5.2-02-A 660917C 10 DEC 2009

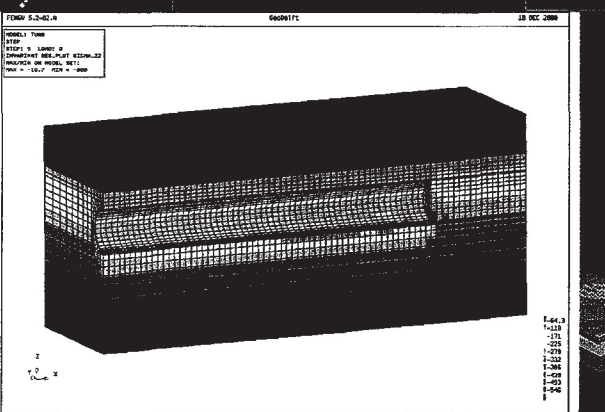
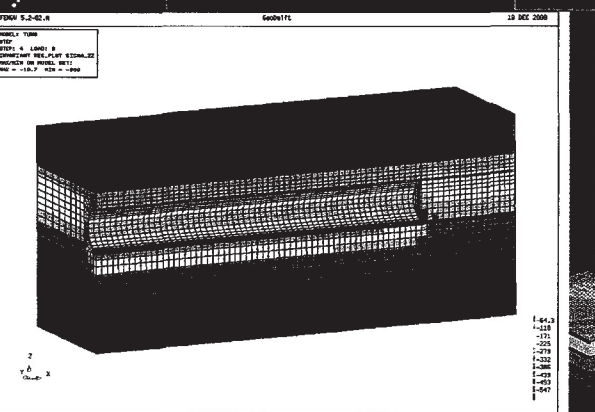
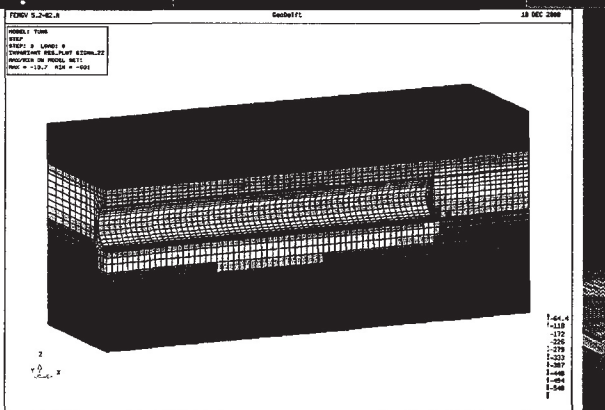
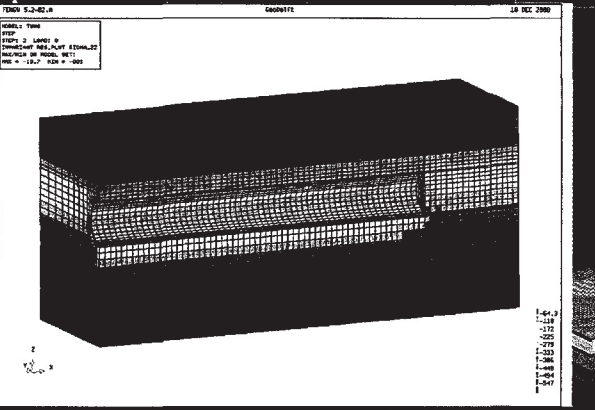
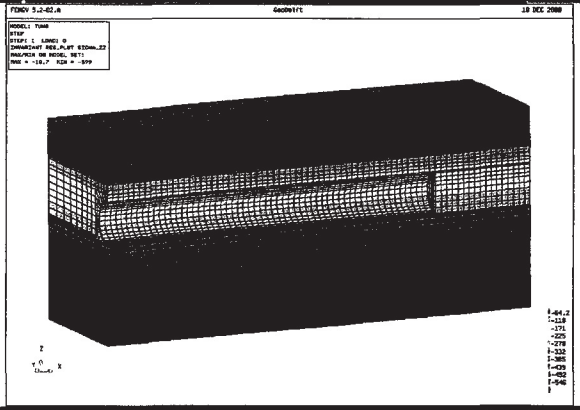


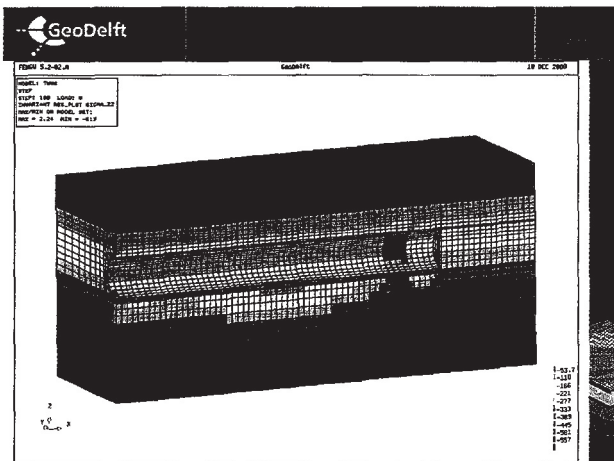
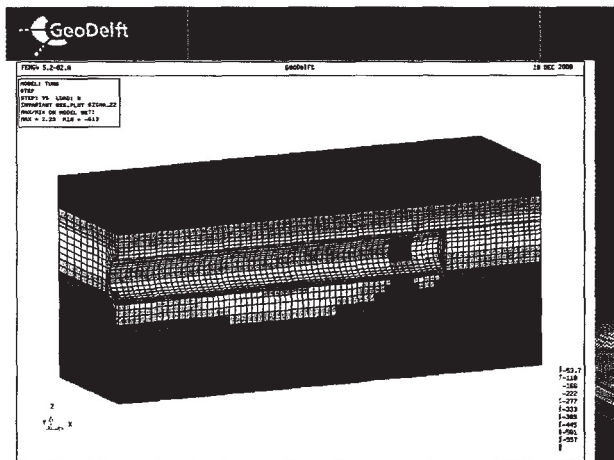
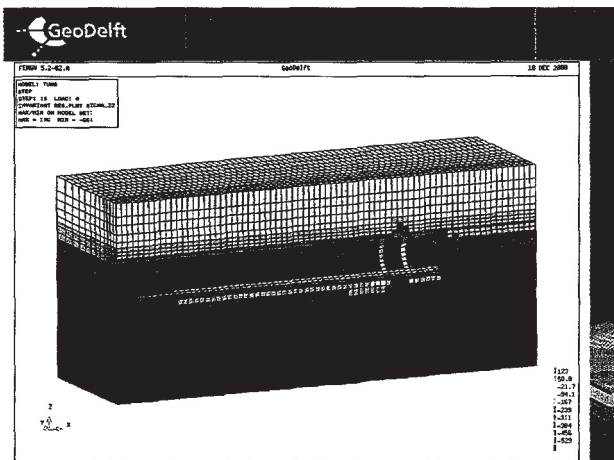
MODEL TIME

RENDERED: 0.000000 0.000000 0.000000



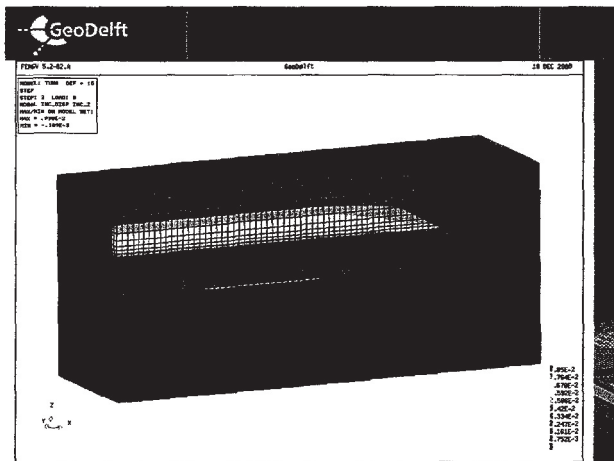
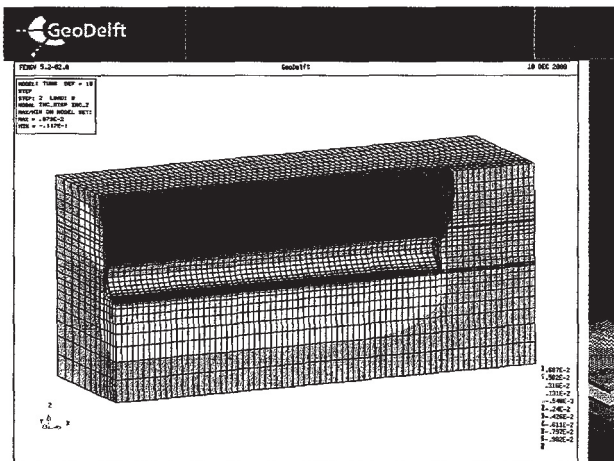
Vertical stress in the soil

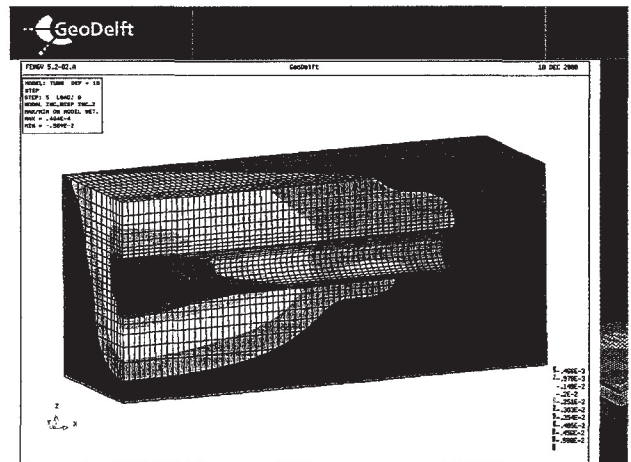
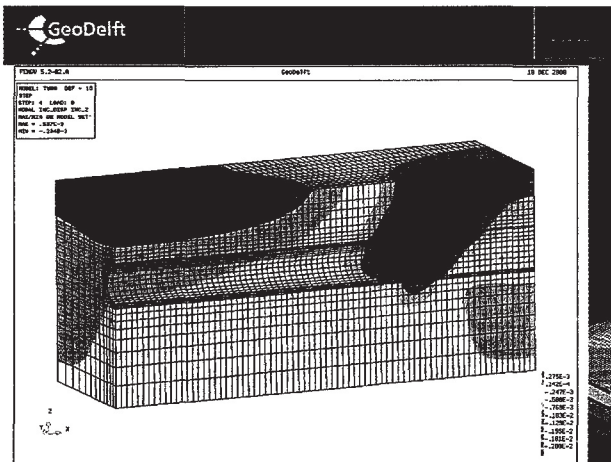




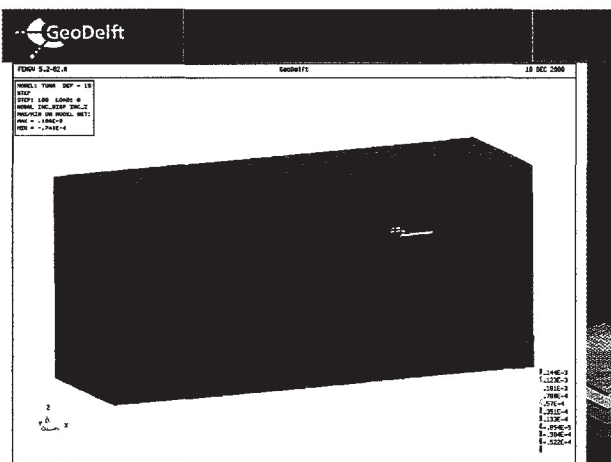
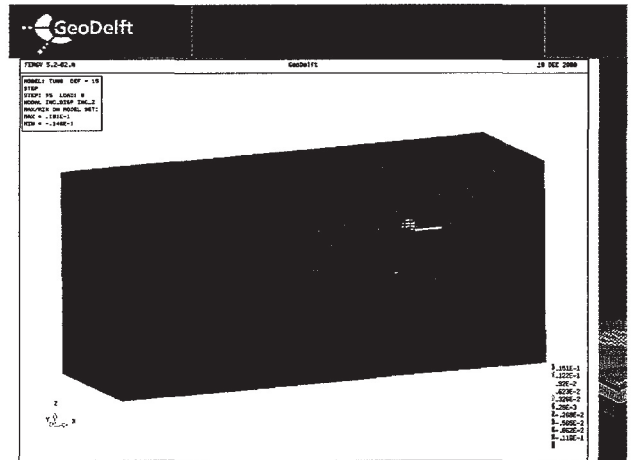
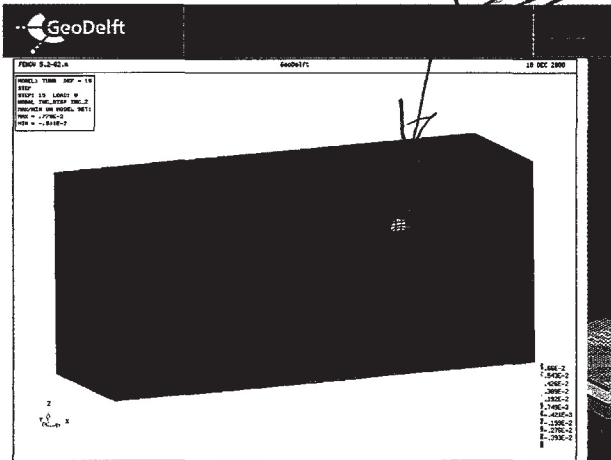
GeoDelft

Vertical displacements increments in deformed mesh





Grondpreek → check Bottek metingen.



Momenten in de lining
M22

