



Plugin for Tunneling and Geotechnical Analysis in Abaqus

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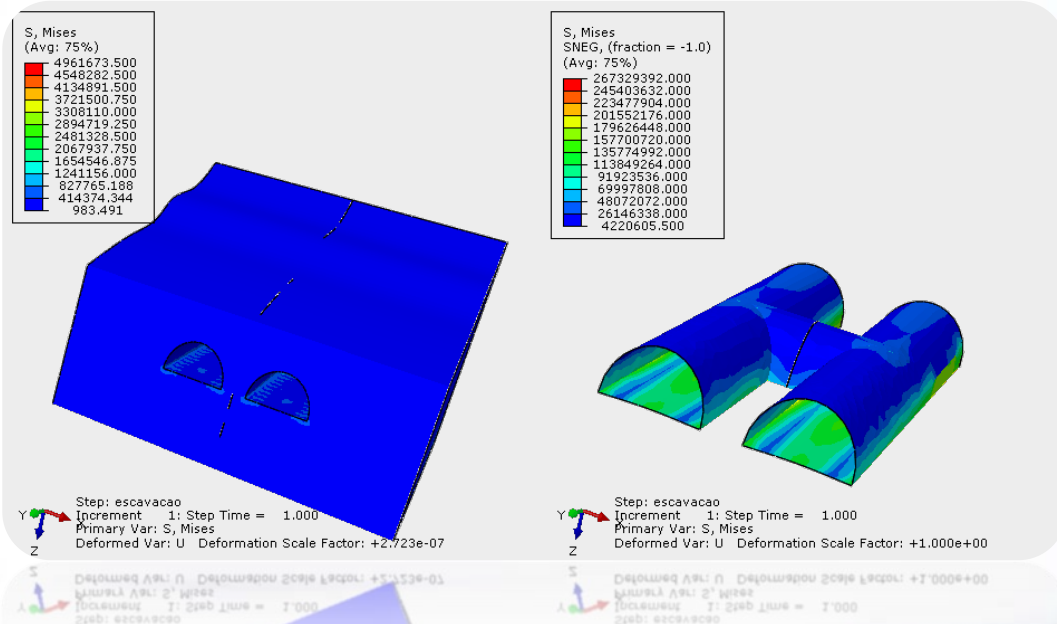
T. Pessoa, A. Ferreira

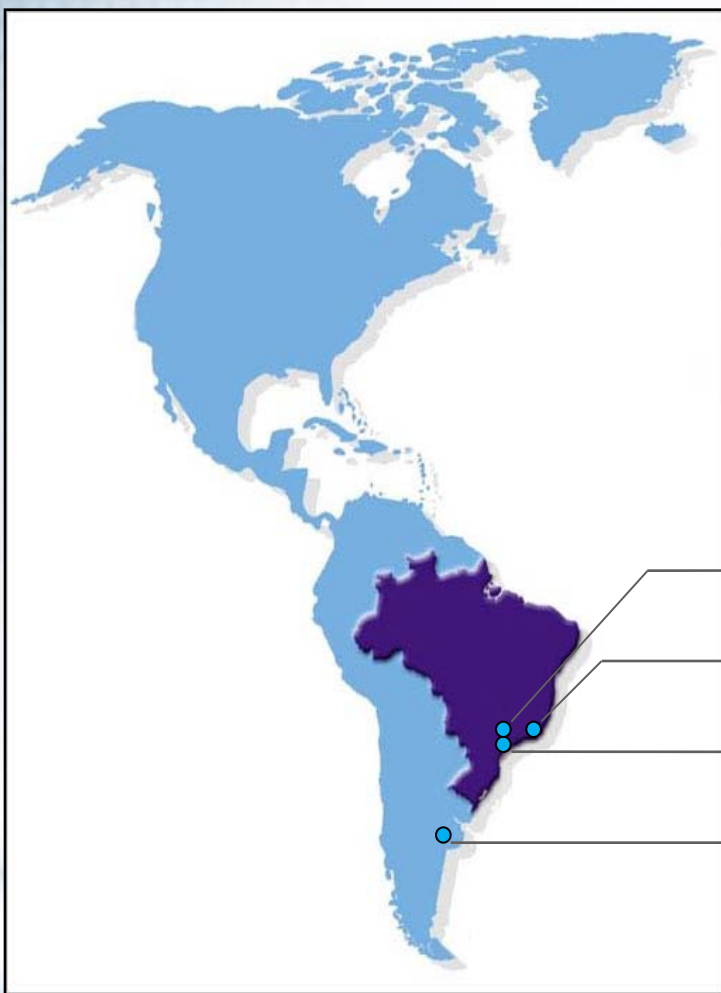
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- SMARTTECH
- Abaqus for Geotechnical Simulation
- The Plugin
- Example
- Conclusion
- Next Steps





- Incorporated 1997
- Employees – 45+
- Customers – 300+

→ Holambra

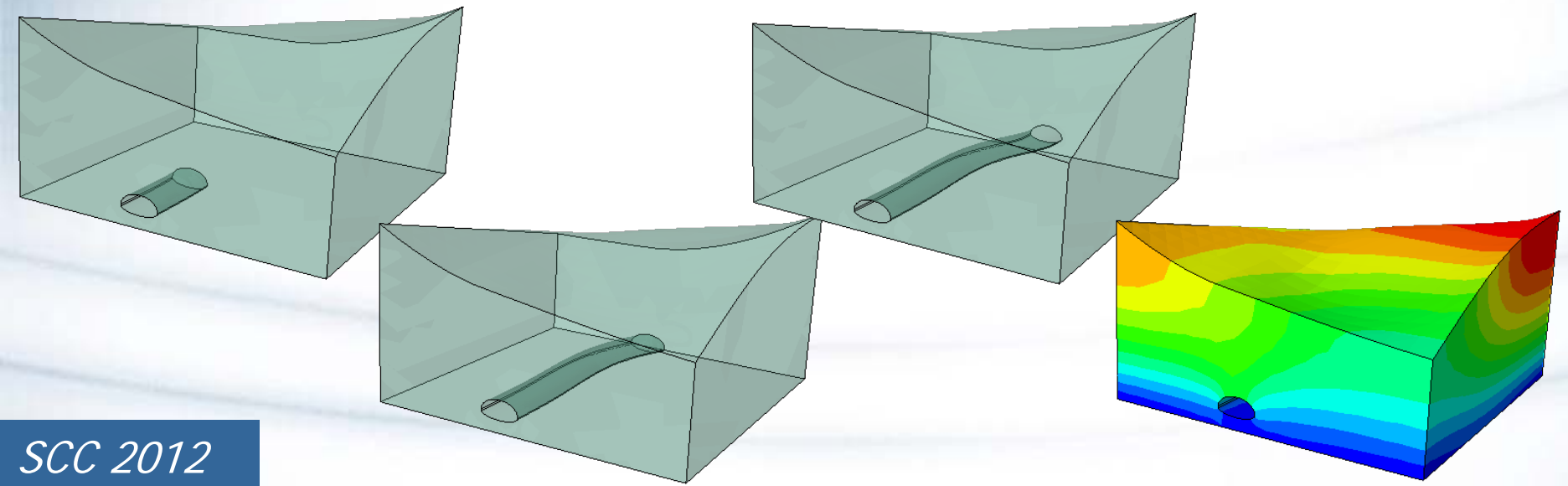
→ Rio de Janeiro

→ São Paulo

→ Buenos Aires

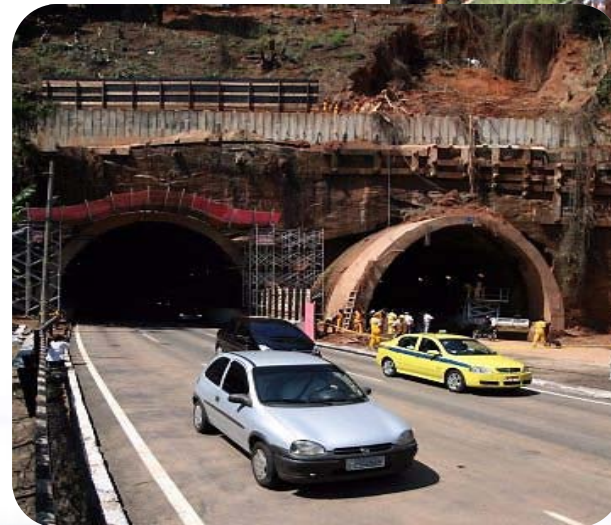
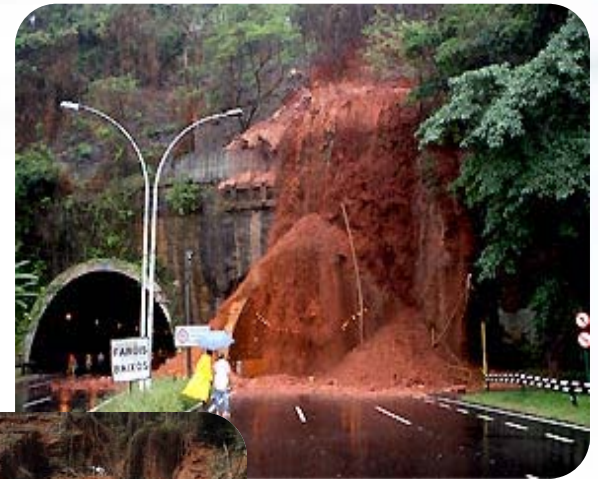


- SIMULIA reseller in Brazil, since 2005
 - In Argentina since 2009
- Engineer company
 - Tests and Simulation
- Geotechnical + Simulation Team



Abaqus for Geotechnical Simulation

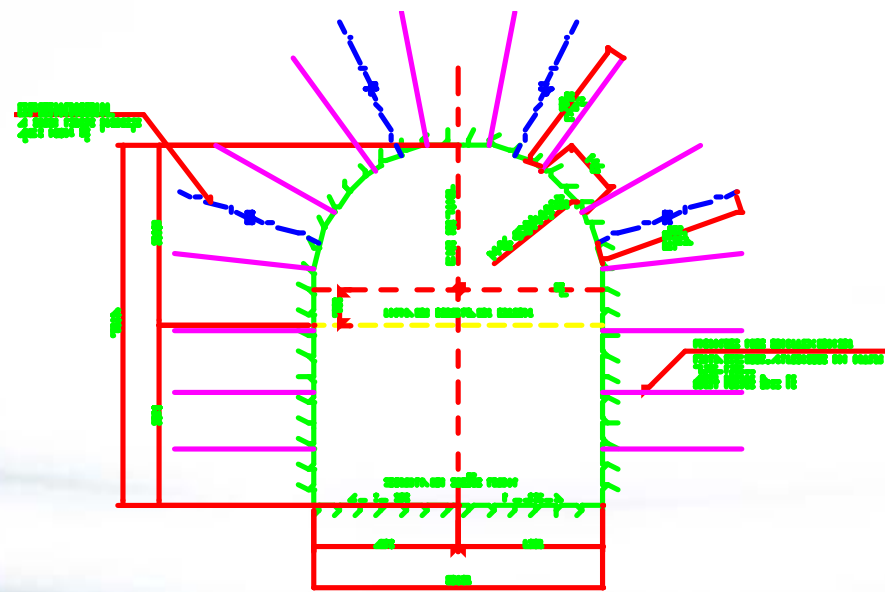
- One of the best FEA
- Implicit + Explicit
- Non-linearities
 - Materials
 - Contact
 - Fracture
- Construction Steps
- Big models





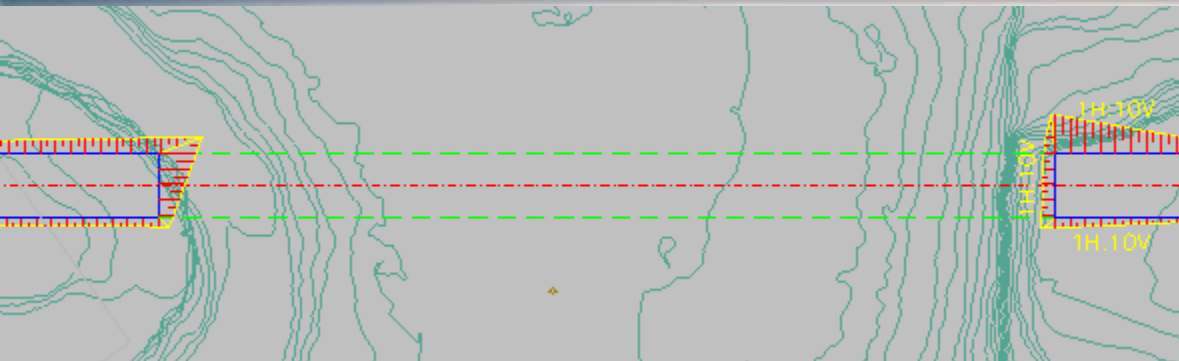
Why develop a plugin?

- Help geotechnical models
- Make constructions steps easier
- Help new users



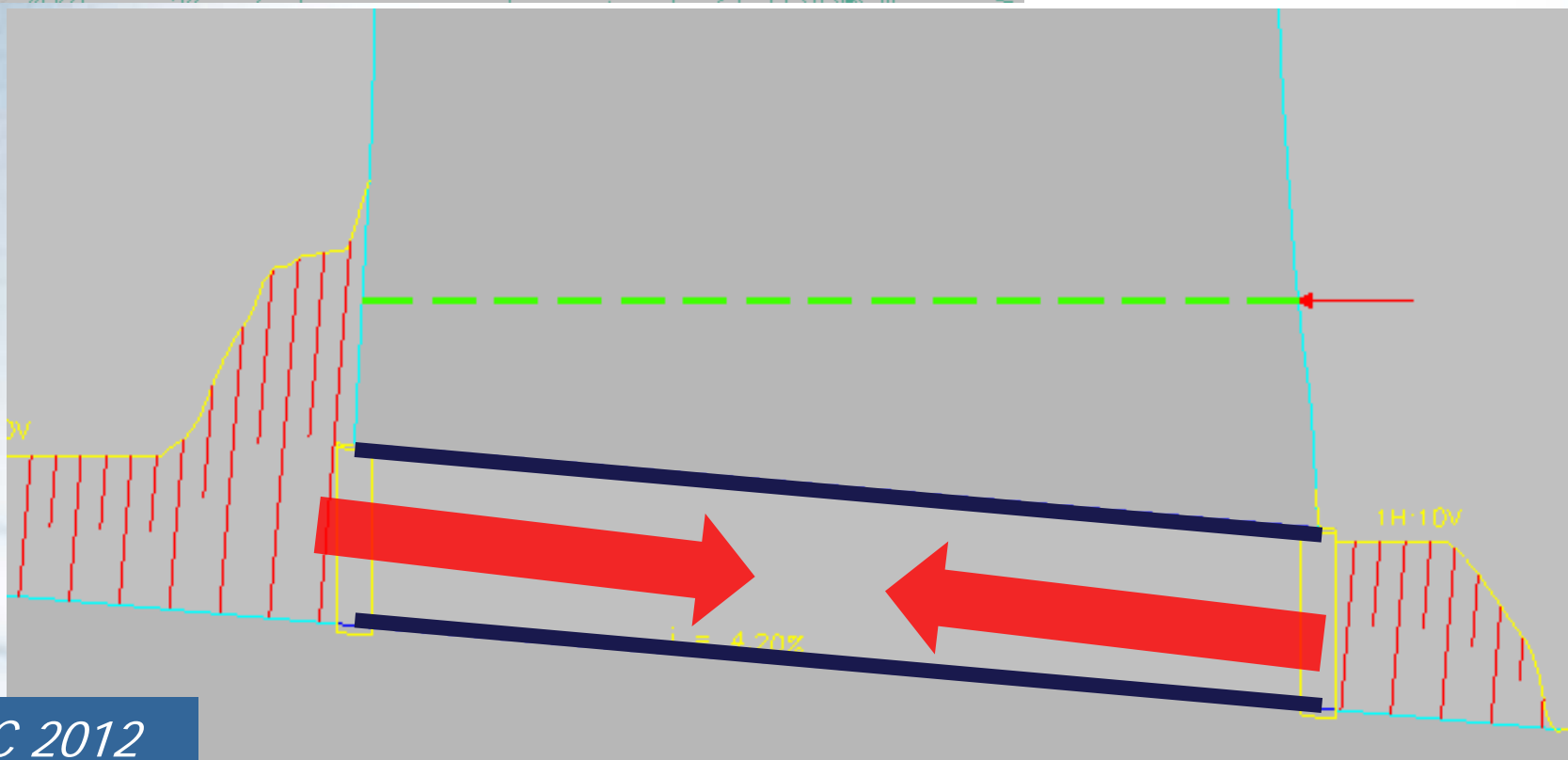


Abaqus



Top View

Cut View

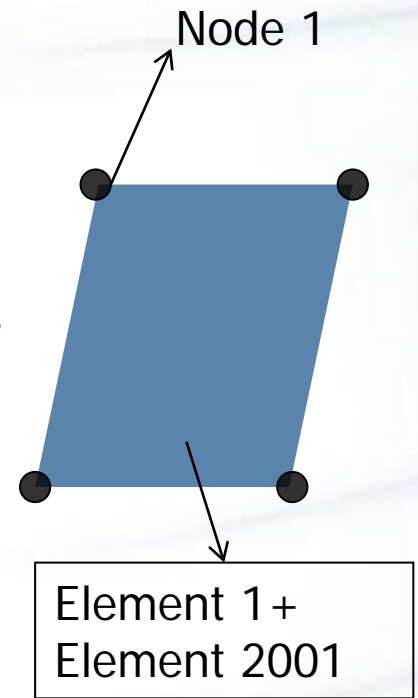




Material Change

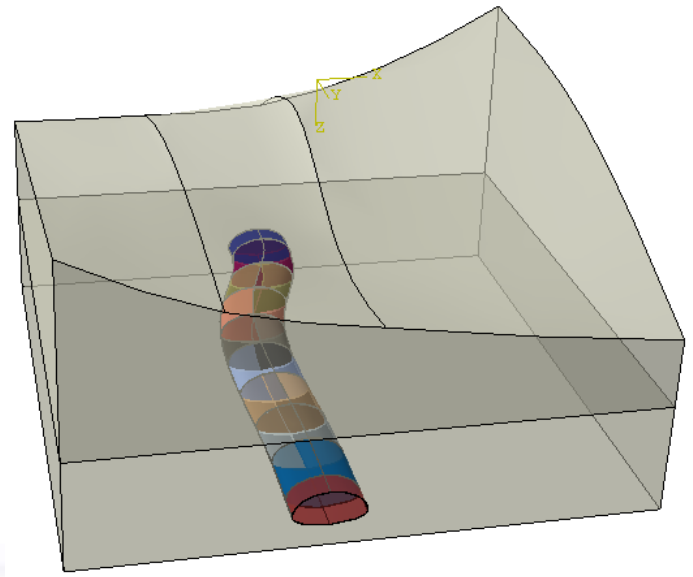
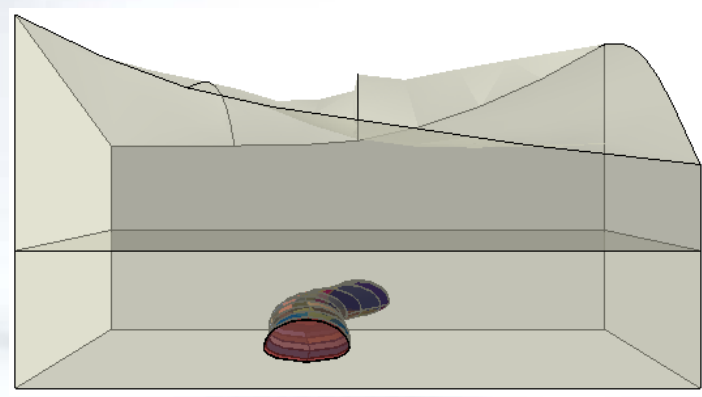
Ex: Rock to Concrete

- **One material** → **different fields**
 - Confusion on material definition
- **Same nodes** → **different elements**
 - No stress on new material
 - CAE can't do that
- **Restart**
 - Too much restart for big models



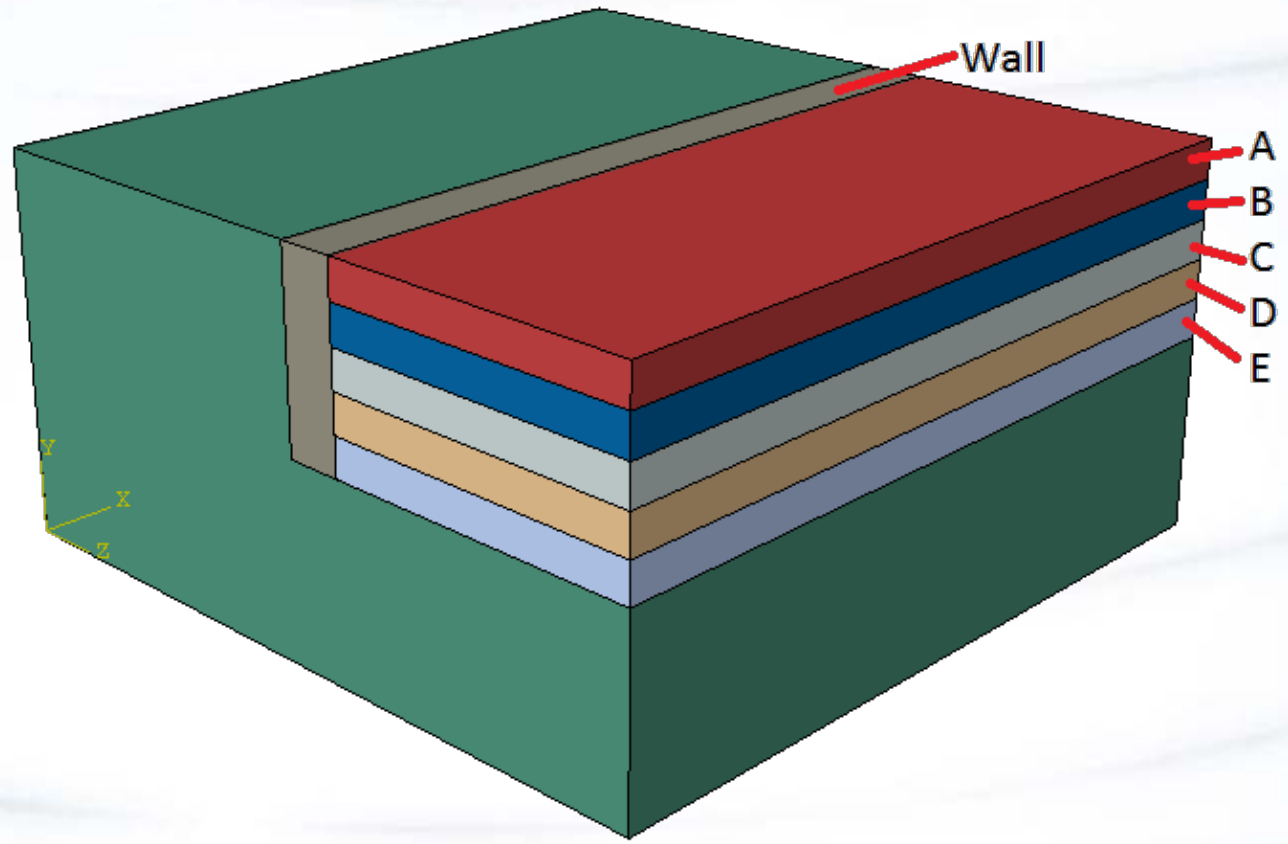


- **MODEL CHANGE**
 - Activate and Deactivate mesh
 - CAE is ok!
 - Plugin make it easier





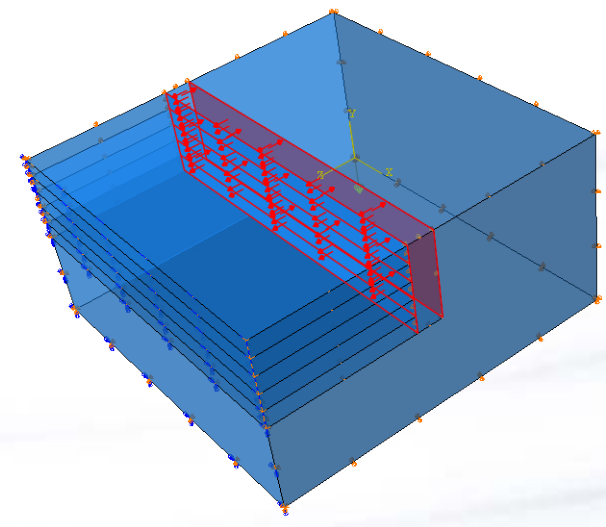
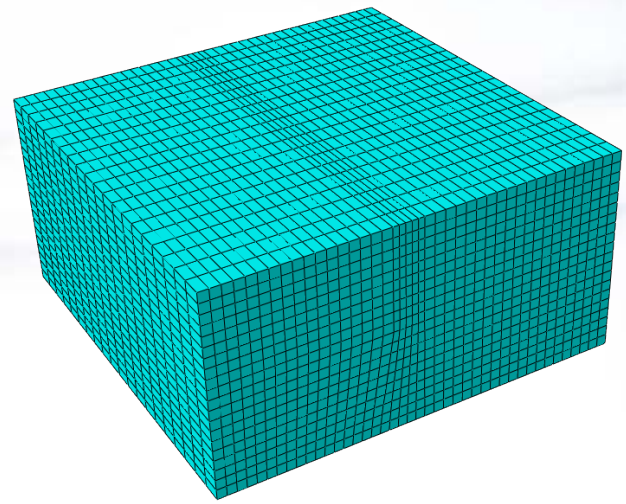
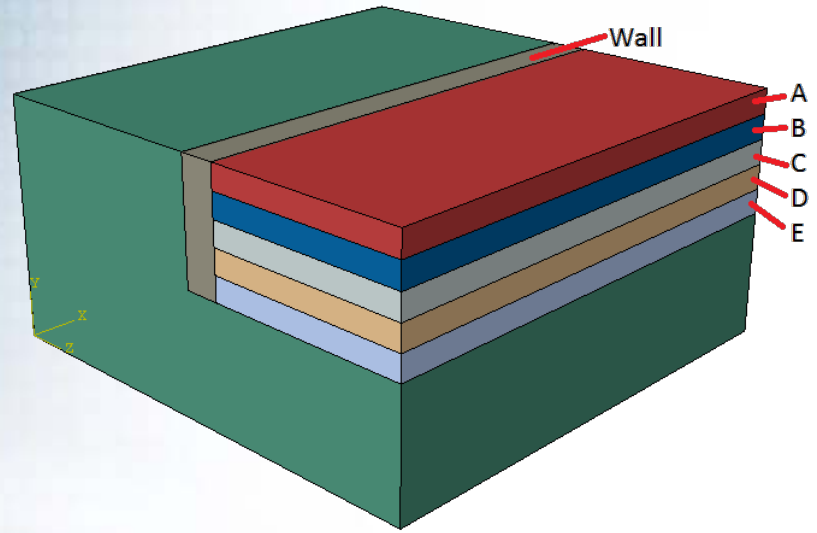
- User defines
 - SET
 - Materials



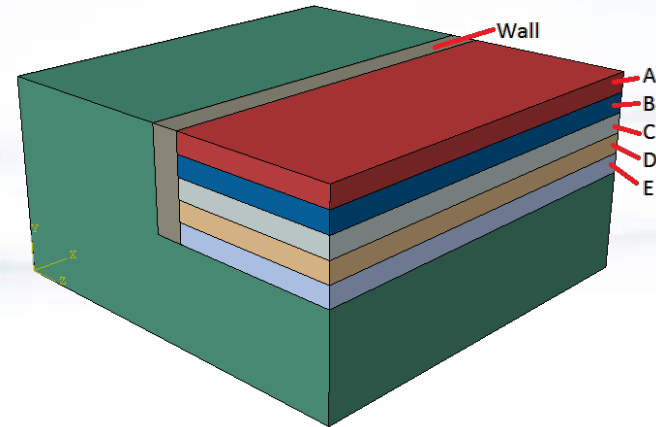


Plugin

- Example
 - Retaining wall
 - 8 Steps



- Plugin Window
 - Simple



Material Change

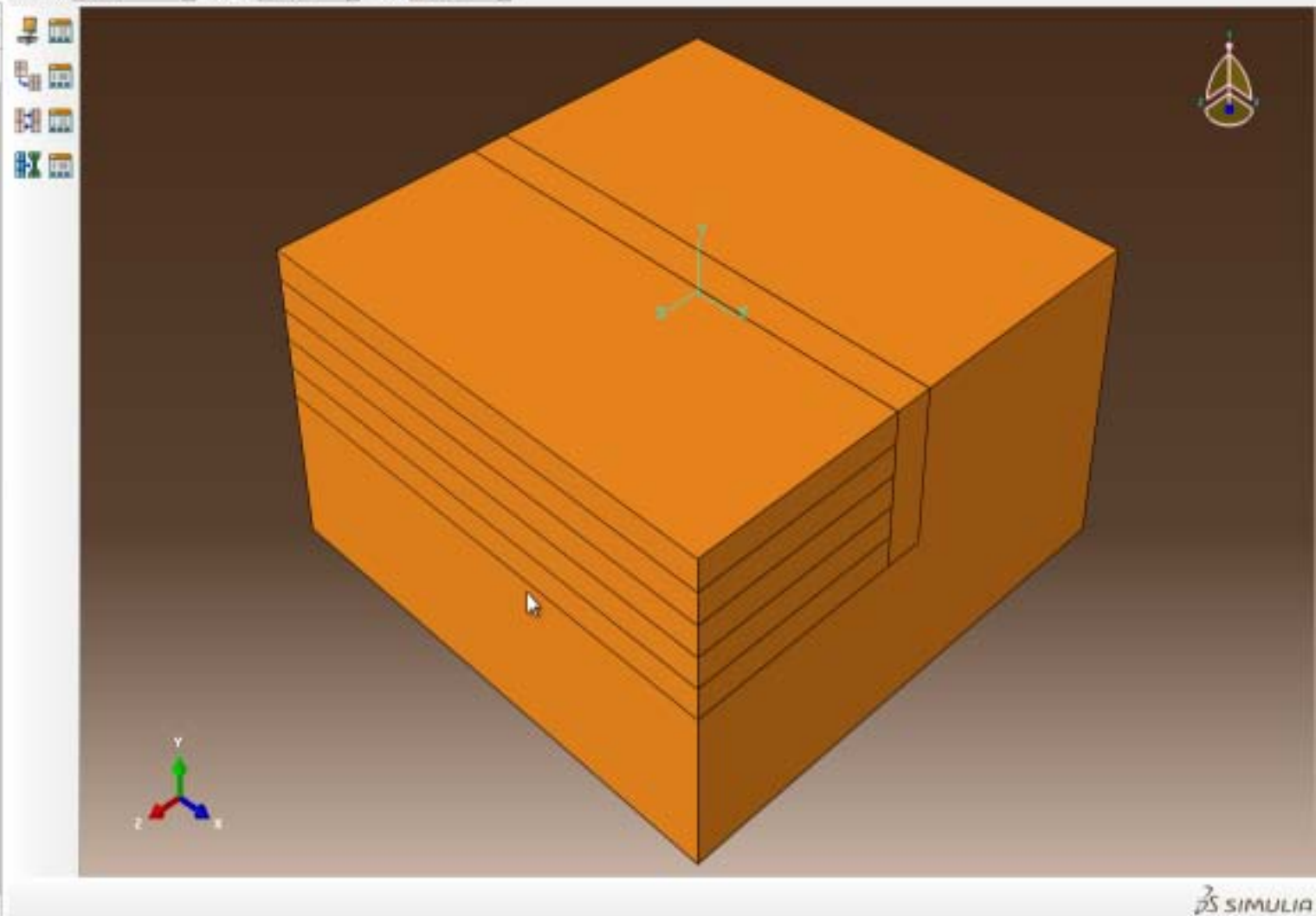
Model	Set	Inicial Step	Change Step	Active	Initial Material(se	Material Change
Model-1	Wall	Initial	Step-2	No	Rock	Rock
Model-1	Wall	Initial	Step-3	Yes	Rock	Rock
Model-1	Wall	Initial	Step-3	Do nothing	Rock	Concrete
Model-1	Step-A	Initial	Step-4	No	Rock	Rock
Model-1	Step-B	Initial	Step-5	No	Rock	Rock
Model-1	Step-C	Initial	Step-6	No	Rock	Rock
Model-1	Step-D	Initial	Step-7	No	Rock	Rock
Model-1	Step-E	Initial	Step-8	No	Rock	Rock

OK Cancel



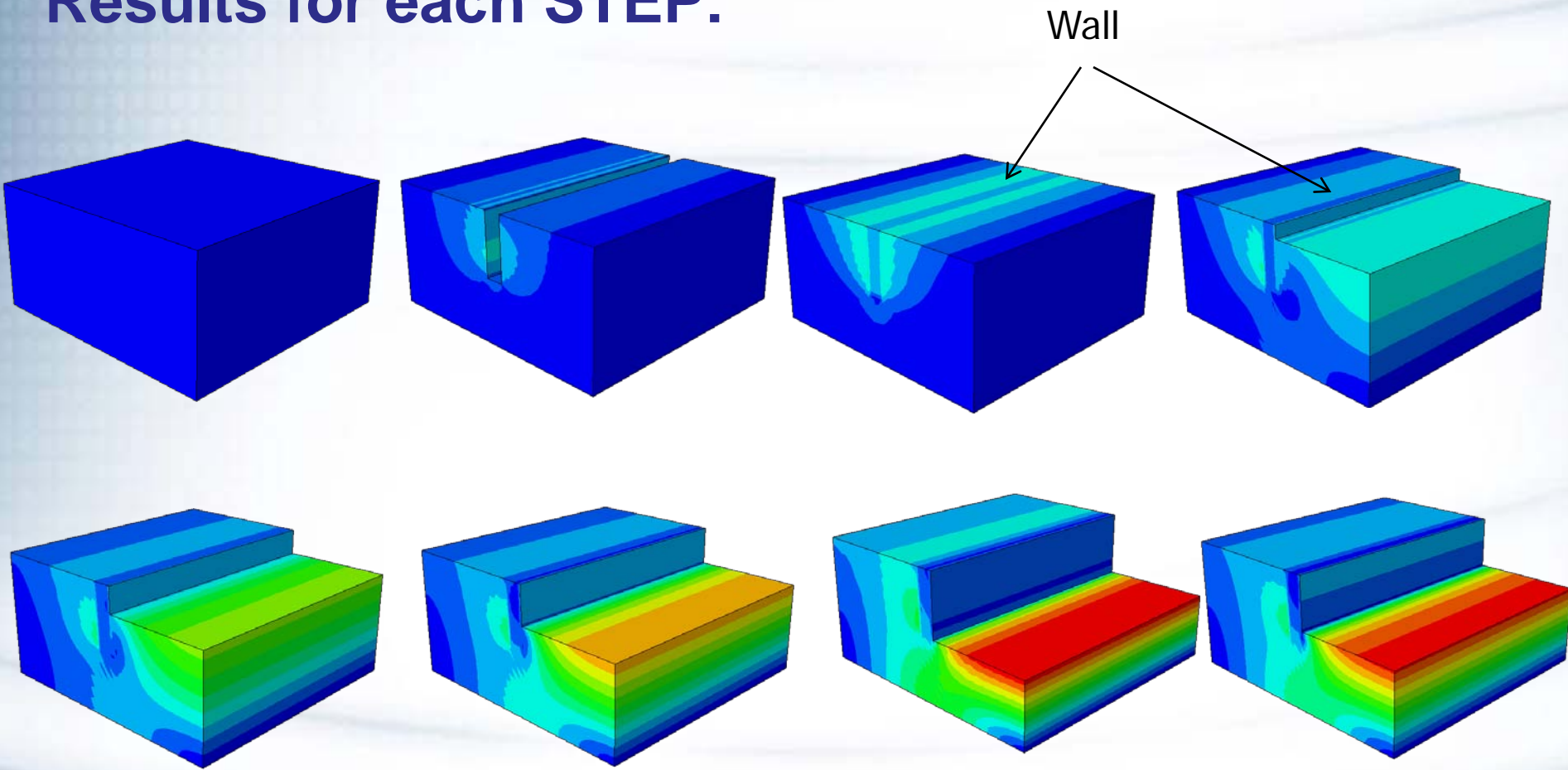
Module: Job Model Model-1 Step Step-2

- Model Database
 - Models (1)
 - Model-1
 - Parts (1)
 - Materials (2)
 - Calibrations
 - Sections (1)
 - Profiles
 - Assembly
 - Steps (10)
 - Field Output Requests (1)
 - History Output Requests (1)
 - Time Points
 - ALE Adaptive Mesh Constraints
 - Interactions
 - Interaction Properties
 - Contact Controls
 - Contact Initializations
 - Constraints
 - Connector Sections
 - Fields
 - Amplitudes
 - Loads (4)
 - BCs (4)
 - Predefined Fields
 - Remeshing Rules
 - Optimization Tasks
 - Sketches
- Annotations
- Analysis
 - Jobs (1)
 - Parede (Completed)
 - Adaptivity Processes
 - Co-executions
 - Optimization Processes





Results for each STEP:





- The plugin make the process faster!
- It helps new users
- If you have interest /or needs... Let us know
- It needs some improvement... next steps
 - Define tunnel section with rebars
 - More options to change materials
 - More interactive
 - ...



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