DEM – Planning the future
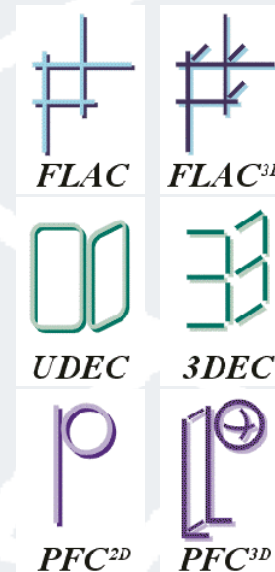
Dr. Lothar te Kamp

ITASCA Consultants GmbH

Gelsenkirchen, Germany

ITASCA
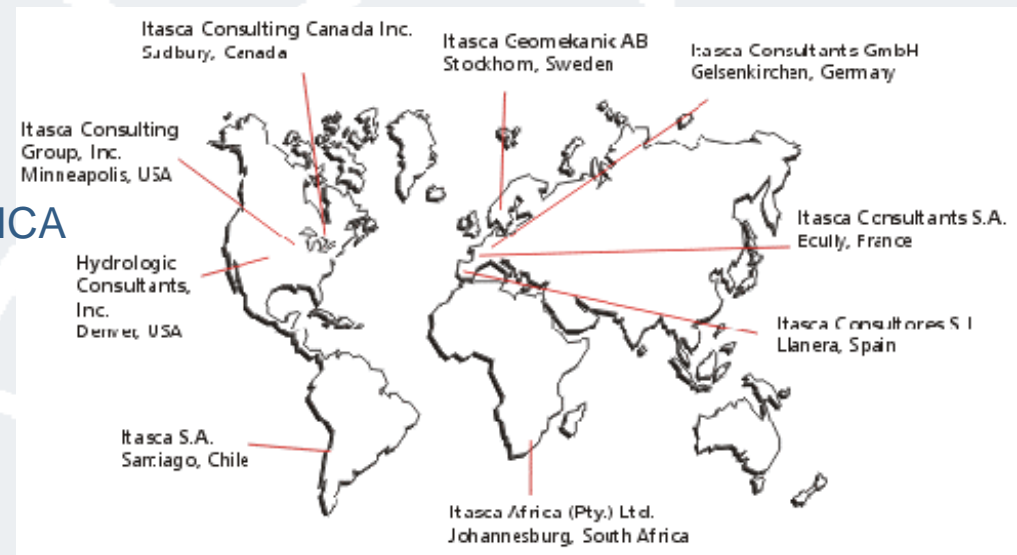Consultants GmbH

ITASCA Consultants

➢ Founded 25 years ago as a geotechnical consulting firm

➢ We provide software

- FLAC / FLAC3D
  Continuum code

- UDEC / 3DEC
  DEM – jointed rock mass
      deformable elements

- PFC2D / PFC3D
  DEM – particle assemblies

FLAC   FLAC³ᴰ

UDEC   3DEC

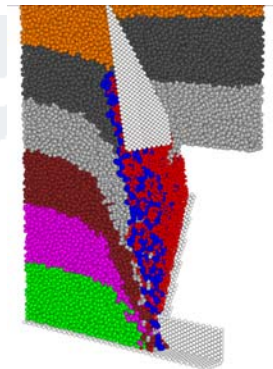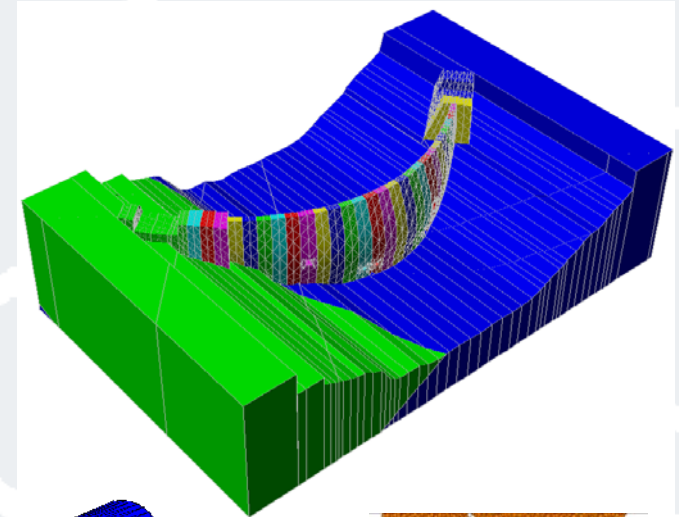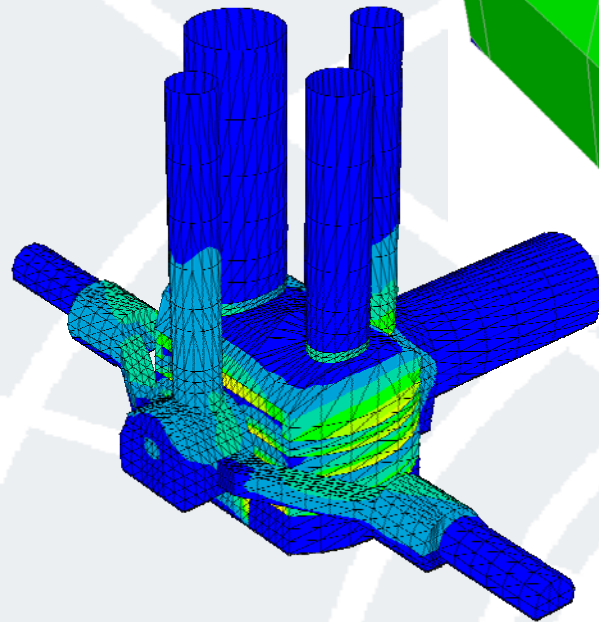PFC²ᴰ   PFC³ᴰ

ITASCA Consultants

➤ Offices in

– Sudbury, CANADA

– Santiage, CHILE

– Wuhan, China

– Lyon, FRANCE

– Gelsenkirchen, GERMANY

– Shizuoka, JAPAN

– Johannesburg, SOUTH AFRICA

– Oviedo, SPAIN

– Stockholm, SWEDEN

– Minneapolis, USA
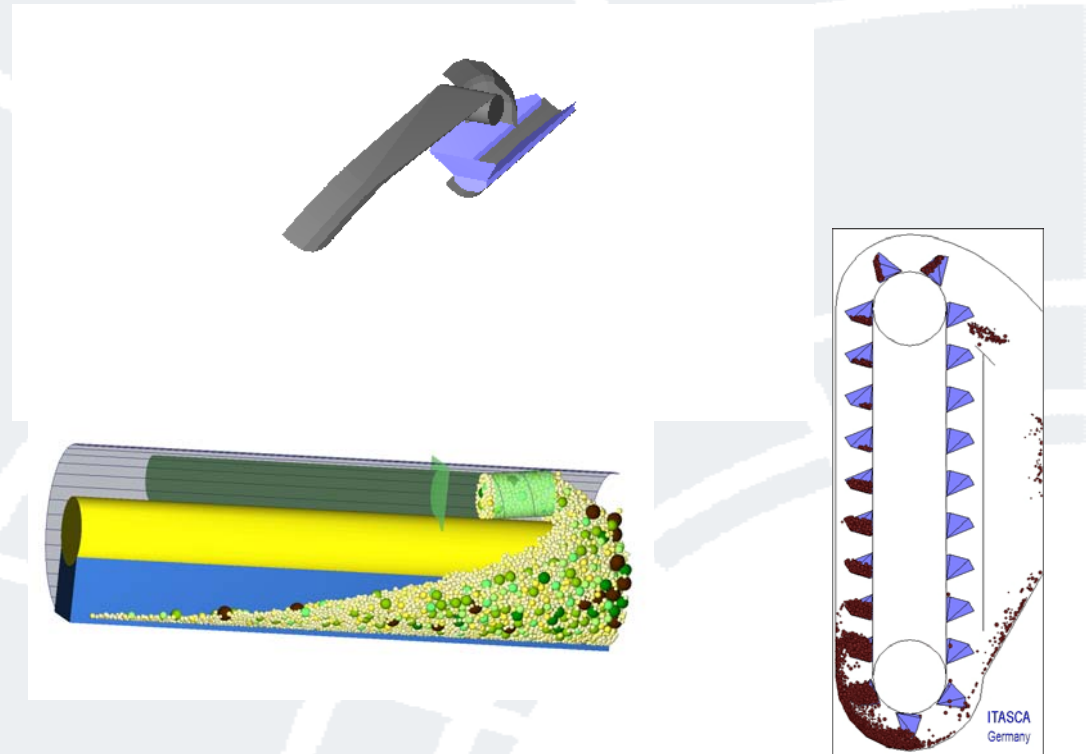
ITASCA Consultants

➢ We provide consulting

– Geotechnics

– Civil engineering

– Mining

– Waste disposal

– Tunneling

– Slopes

– Groundwater flow

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Consultants GmbH

ITASCA Consultants

➢ We provide consulting

– Storage

– Conveying

– Dosing

– Agglomeration

– Peletting

– Sorting

– Blending

Planning the future

➢ Application

– More acceptance from industry

– New fields of application

➢ Development

– Mechanics and Physics

– Model size

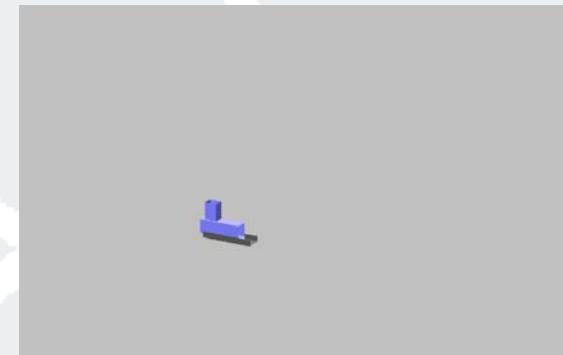– Calculation speed

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Application

➢ More acceptance from industry

– Prove that DEM can

- Solve their problems

- Reduce costs

- Replace costly experiments

- Support the design

- Prove concepts

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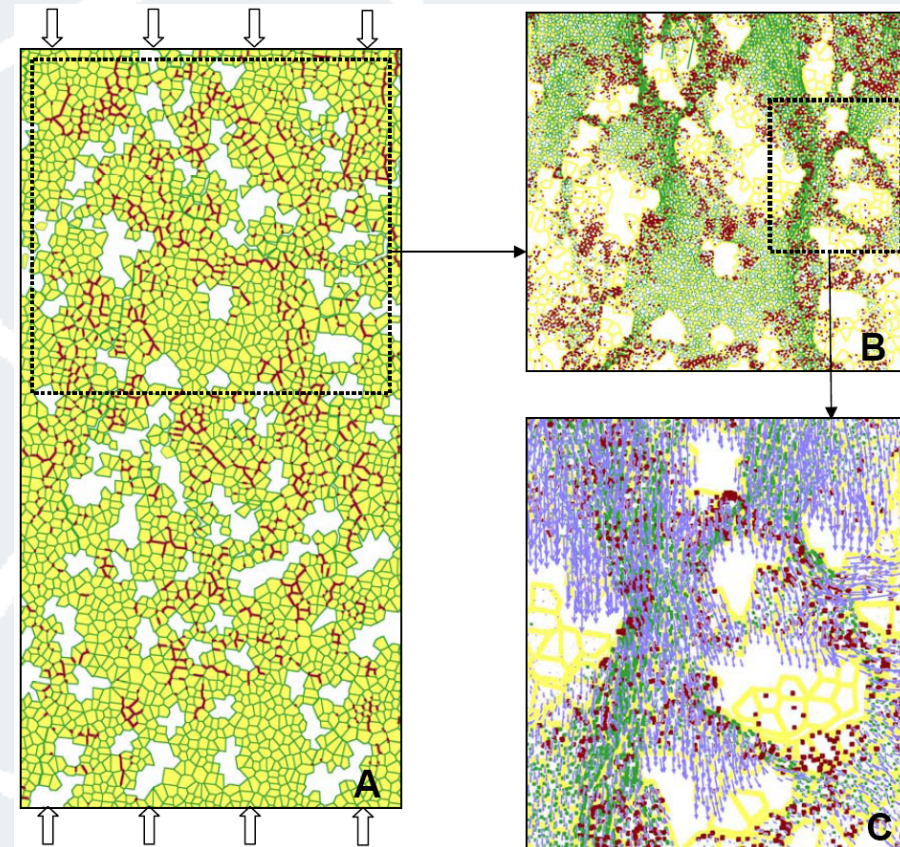
Application

➢ **More acceptance from industry**

– Validation of the DEM

- Run selected problems with good experimental backup

- Numerical prove of concepts

– Definition of standards

- E.g., influence of model setup

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Application
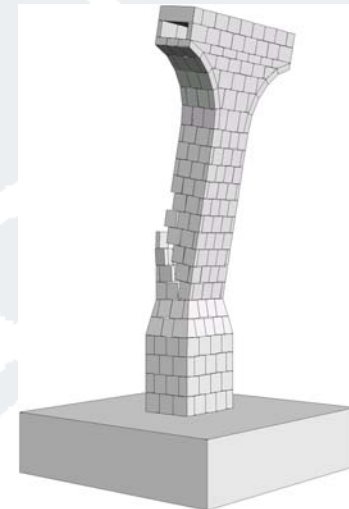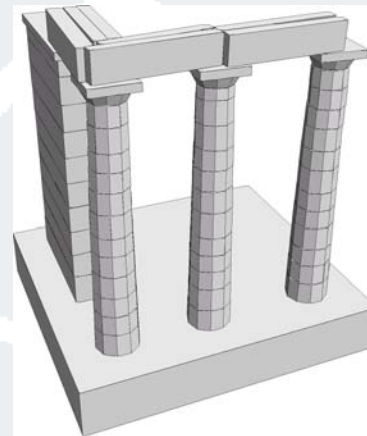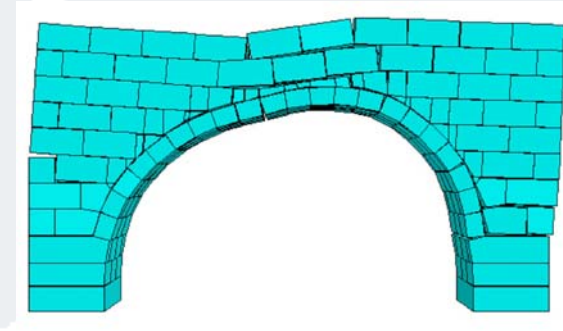
> ## New fields

– Loading and damage
of mineral structures

Application

➤ New fields

– Masonry and buildings under static and dynamic load

Development

➢ Mechanics and Physics

– Material behavior

- Contact models
- Particle shape

– Other effects

- e.g. electrostatic charge

– Coupling

- Fluid
- Thermal

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Development

➢ Model size / computation time

  – Scaling laws

  – Different algorithms

  – Different hardware

  – Different compilers

Remarks

- Researcher and software vendors strongly depend on the input from industry
- Identify a few selected problems and validate DEM
- Set up a strategy for future development
  - Identify the needs
  - Identify potential fields of application
  - Questionnaire ?
- More cooperation of universities and the software vendors

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Thank you for your attention !

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