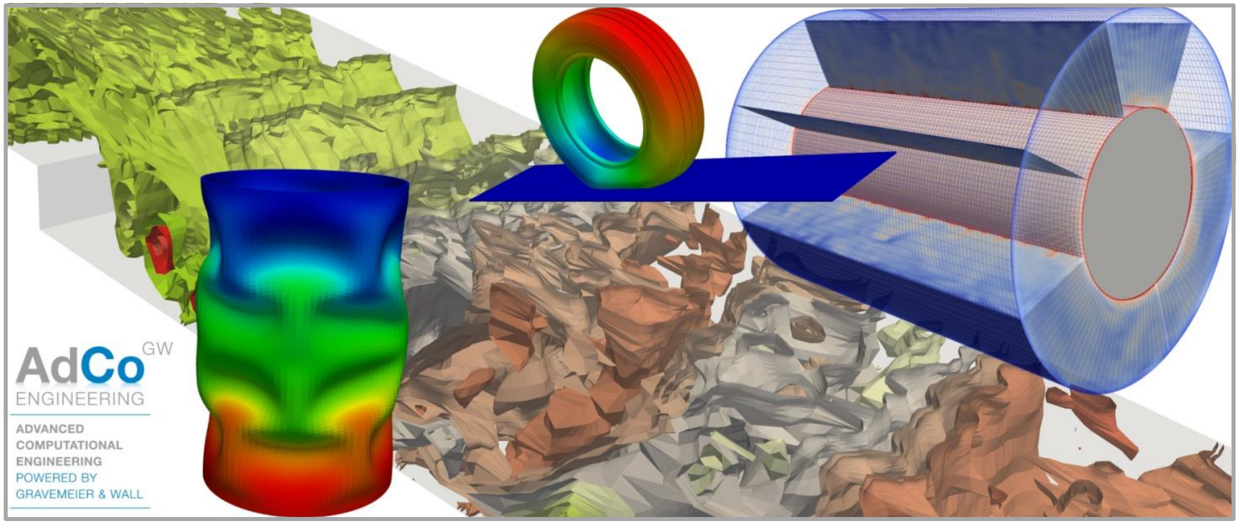
Field Report of Co-Funded Cooperation

AdCo GW
ENGINEERING

ADVANCED
COMPUTATIONAL
ENGINEERING
POWERED BY
GRAVEMEIER & WALL



Canada Info Sessions – Spring 2019, Munich, January 29, 2019

Outline

- Who are we?
- What is our project about?
- How did we get the project on track?

Outline

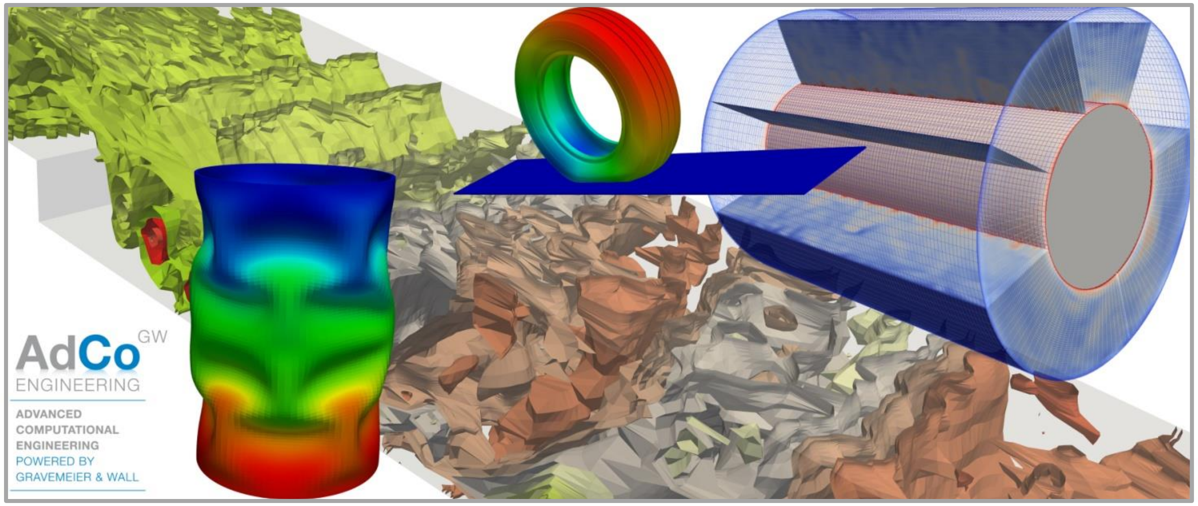
- Who are we?
- What is our project about?
- How did we get the project on track?

AdCo GW ENGINEERING

The Company

- 2011: enrollment in German commercial register
- January 1, 2012: active start
- Spin-off of Institute for Computational Mechanics, TU München
- Company mantras:

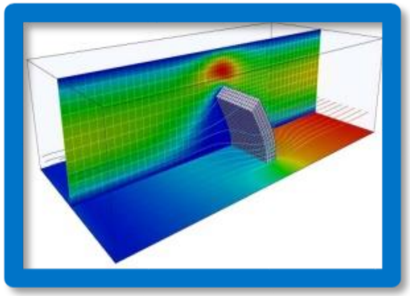
“Advanced Computational Engineering” and “Advances via Computational Engineering”



AdCo GW
ENGINEERING
ADVANCED
COMPUTATIONAL
ENGINEERING
POWERED BY
GRAVEMEIER & WALL

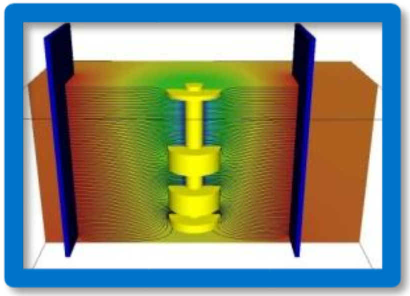
- More than standard analysis and solutions usually achievable with commercial and open-source software packages
- Flexible problem-oriented solution approaches
- Use of both time-tested traditional analytical methods as well as, where appropriate, the newest highest-fidelity numerical methods to solve your problems
- Broad range of applications over almost entire spectrum of engineering, from solid mechanics to fluid mechanics to biomedical engineering

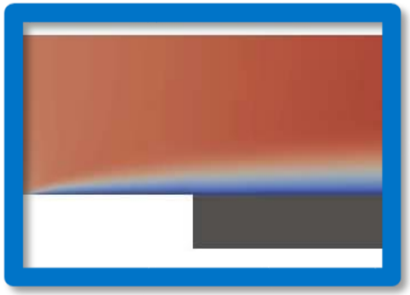
Core Competence: Coupled Multiphysics Problems

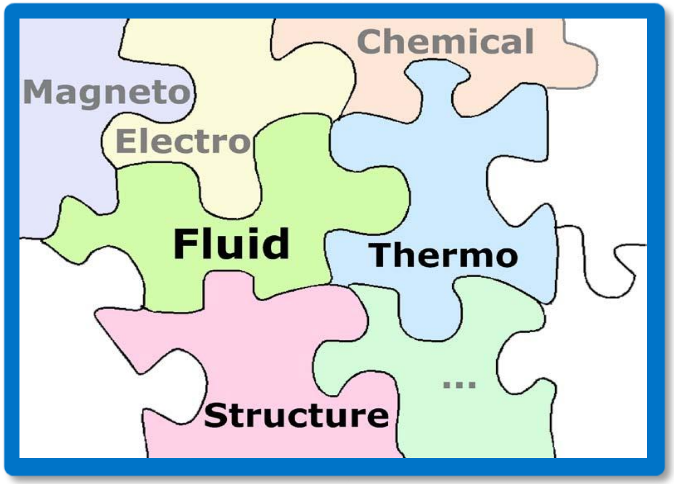


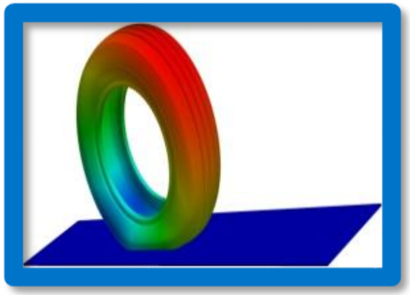
Fluid-structure interaction

Electrochemistry



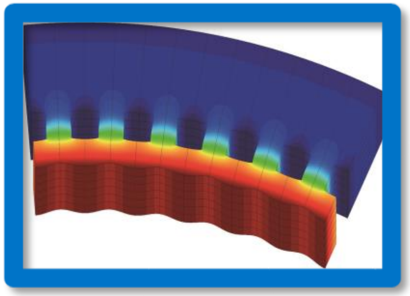






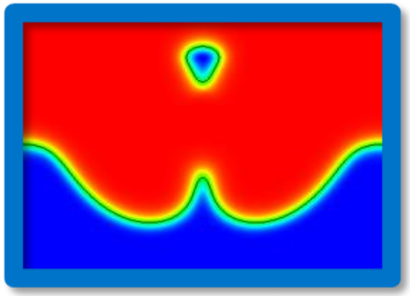
Thermo-fluid-structure interaction

Contact



Thermo-structure interaction

Combustion



Outline

- Who are we?
- What is our project about?
- How did we get the project on track?

Project Partners

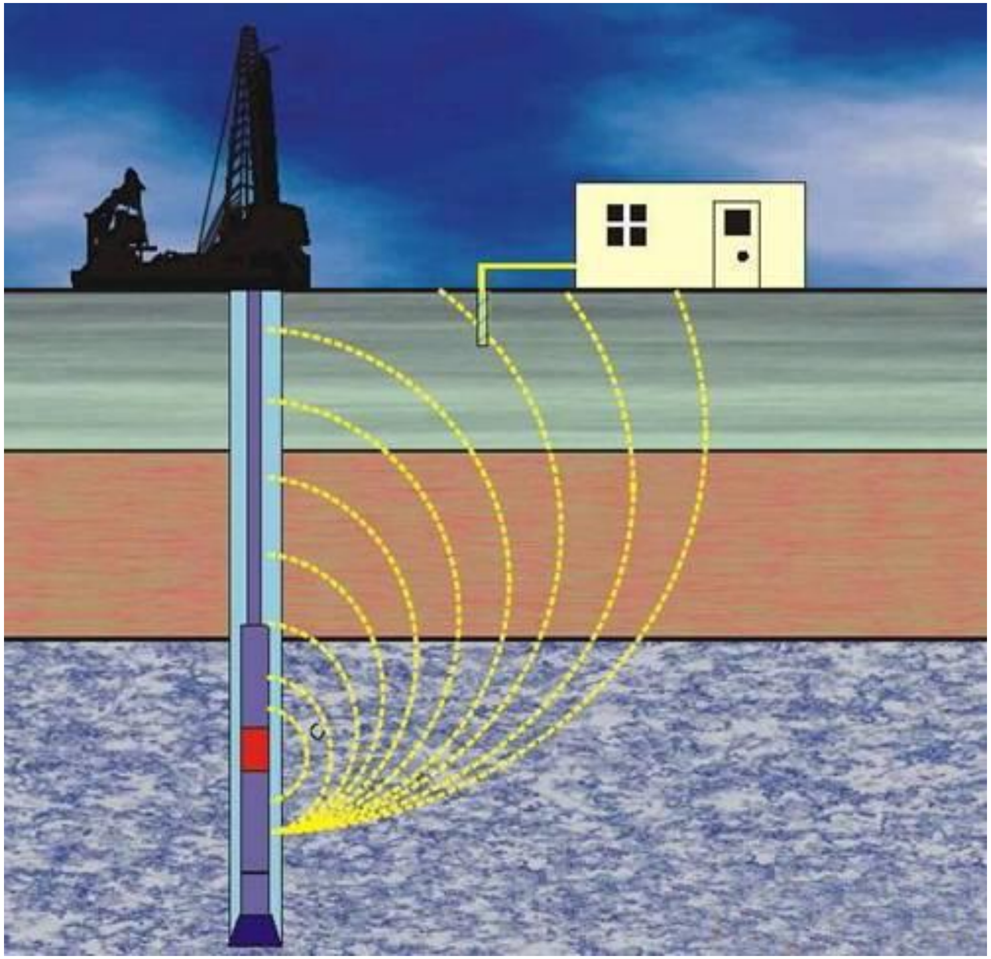
Project Title: Electro-Magnetic Telemetry Signal-to-Noise Spectrum Analyzer

AdCo^{GW} ENGINEERING

ADVANCED COMPUTATIONAL ENGINEERING POWERED BY GRAVEMEIER & WALL

MWDPlanet and Lumen Corporation

Project Topic: Electro-Magn. Telemetry on Drilling Sites



Schematic of EM telemetry system for Measurement-While-Drilling (MWD), source: http://www.bjbaonton.com

Why is this Project Topic Promising?

The Economist April 8th 2017

Oil and technology

Data drilling

The oil industry struggles to enter the digital age

IT SOUNDS like a spectacular feat of engineering. Employees of Royal Dutch Shell located in Calgary, Canada, recently drilled a well 6,200 miles (10,000km) away in Vaca Muerta, Argentina. In fact, the engineers of the Anglo-Dutch oil major were using computers to perform what they call "virtual drilling", based on their knowledge of Fox Creek, a shale bed in Alberta, which has similar geological features to Argentina's biggest shale deposit. They used real-time data sent from a rig in Vaca Muerta to design the well and control the speed and pressure of the drilling. On their second try, they completed the well for $5.4m, down from $15m a few years ago. "It's the cheapest well we've drilled in Argentina," says Ben van Beurden, Shell's chief executive.

Shell is not alone in deploying computer wizards alongside geologists in an attempt to lower costs in an era of moderate oil prices. The industry as a whole is waking up to the fact that digitisation and automation have transformed other industries, such as commerce and manufacturing, and that they have been left behind. Technology firms and consultancies are knocking on their doors peddling alluring concepts like the "digital oil rig" and the "oilfield of the future". Some argue that the embrace of digital technologies could be the next big thing after the shale revolution that started to transform oil and gas production in America a decade ago. But this is an industry that embraces new technologies only in fits and starts.

Once, Big Oil was at the forefront of digitisation, pioneering the use of 3-D seismic data and supercomputers to help find resources. But priorities changed, especially during the past decade when oil prices rose above $100 a barrel and the primary goal was to find more of it, whatever the cost. Whizzy new technology took second place. Ulrich Spiesshofer, chief executive of ABB, a Swedish-Swiss automation-technology company, says the oil industry puts to use in exploration activities barely 5% of the seismic data it has collected. During production of oil, less than 1% of data from an oil rig reaches the people making decisions, reckons McKinsey, a consultancy.

It is the process of extracting oil and gas that is considered most ripe for digitisation and automation. Drilling often takes place miles below the surface in rock formations where drill bits and pipes can be broken or snagged, which halts activity for long periods. Baker Hughes, an oil-services firm, has recently developed what it calls the first automated drill bit, capable of self-adjusting depending on the nature of the rock. McKinsey says undersea robots are also being deployed to fix problems.

Above the surface, efforts are under way to reduce the amount of people and plant on oil rigs, helping improve safety in a dangerous industry. James Aday, a veteran oil driller now at Wood Mackenzie, a consultancy, says that on the drilling platform itself, automation is not new. Others say that more rigs are being controlled semi-remotely; in the Gulf of Mexico, engineers in Houston use real-time data from oil rigs to make decisions, reducing the cost of shuttling them by helicopter to rigs. "The aim is to bring the data to the expert, not

"… Some argue that the embrace of digital technologies could be the next big thing after the shale revolution that started to transform oil and gas production in America a decade ago …"

AdCo GW ENGINEERING

Outline

- Who are we?
- What is our project about?
- How did we get the project on track?

Timeline to Project: Steps 1 - 3

Step 1 (October):

- Alberta-Germany Collaboration Fund Symposium in Munich
- One-on-one meeting of CEO, AdCo Engineering^{GW} GmbH and VP, MWDPlanet and Lumen Corporation for discussing potential collaborative project

Step 2 (November):

- First online meeting of company representatives
- Mutual familiarization with expertise of project partner
- Generation of first outline of project idea
- Decision to extend project partnership to include Technical University of Munich

Step 3 (December):

- Start of work on project proposals (inc. various online meetings of partners)
- Anticipated date of project start: July 1

Timeline to Project : Steps 4 - 6

Step 4 (March):

- Completion and submission of project proposal forms, that is,
  1) Joint proposal application
  2) GCCIR application
  3) ZIM application
  4) Draft of Cooperation Agreement (not yet signed)

Step 5 (May/June):

- Grant by AiF and GCCIR
- Finalization of Cooperation Agreement

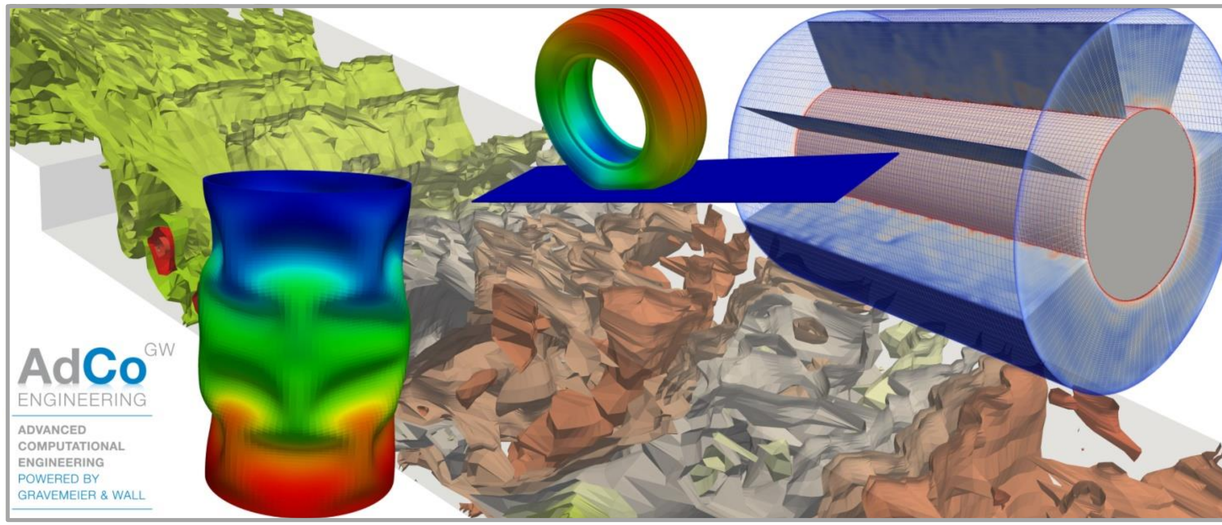
Step 6 (July):

- Start of project

Thank you very much for your attention!

AdCo GW
ENGINEERING

ADVANCED
COMPUTATIONAL
ENGINEERING
POWERED BY
GRAVEMEIER & WALL



For more information, please visit us:

http://www.adco-engineering-gw.com