REV-SIM WEBINAR SERIES

Democratizing Simulation:
Can Non-Experts Safely Utilize Advanced Modeling & Workflows?

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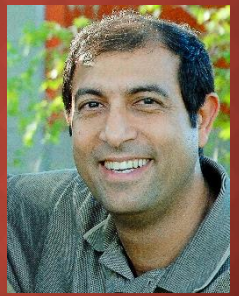

October 25, 2018

AGENDA

- Introduction to the *Revolution In Simulation* Community
  - Democratization of Simulation
    What is it and why is it important?
- **Case Study 1:** ZF (TRW) Pitman Arm Smart Generator
- **Case Study 2:** Automotive Disk Brake Analysis
- Q&A

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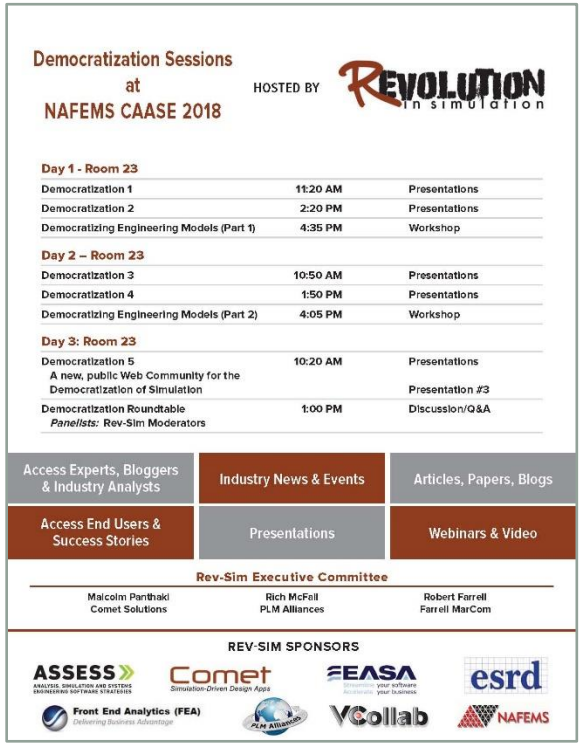
THE "REVOLUTION" BEGAN AT THE NAFEMS CAASE 2018 CONFERENCE



15 presentations

2.5 days out of 3

Highest attended track

Best Presentation from this track

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WHAT IS THE REVOLUTION?

- *Revolution in Simulation* is a non-profit industry-wide movement that works to educate, advocate, collaborate, and innovate to make engineering simulation not just more powerful and efficient for existing CAE experts, but also more accessible and reliable for occasional users or non-experts. This is the *Democratization of Simulation*.

- The goal is to make simulation more effective for the experts and to rapidly accelerate the democratization of simulation to expand the usage of engineering simulation as it has been practiced over the past few decades – an act that many would call revolutionary!

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WHAT IS *REV-SIM.ORG* ABOUT?

- The ***Rev-Sim.org*** website provides expertly curated resources through an open, free community platform to share the latest industry news, success stories, case studies, blogs, whitepapers, webinars, best practices, consultant advice, newsletters, and information on solution and service providers.

- Since its launch in June 2018 it is quickly becoming *THE online community-building web portal that advances the democratization of simulation for the benefit of industry and users.*

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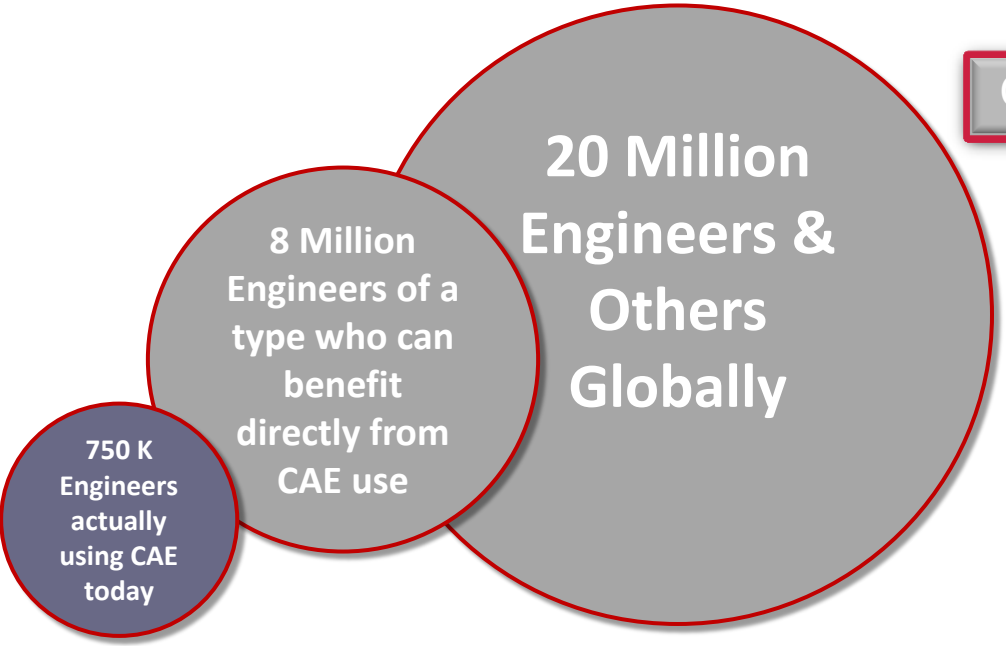
WHY IS DEMOCRATIZATION NEEDED?



Current Simulation (CAE) Realities

- Significant barriers to adopting CAE across the enterprise
- High expertise required
- High training/experience required
- Most product engineers cannot access the power of simulation
- *Even experts use a manual, error-prone inefficient process*

750,000 simulation experts → *8 million engineers* → *20M potential users*

*Source (2014): Cambashi; Front End Analytics (FEA) *Delivering Business Advantage*

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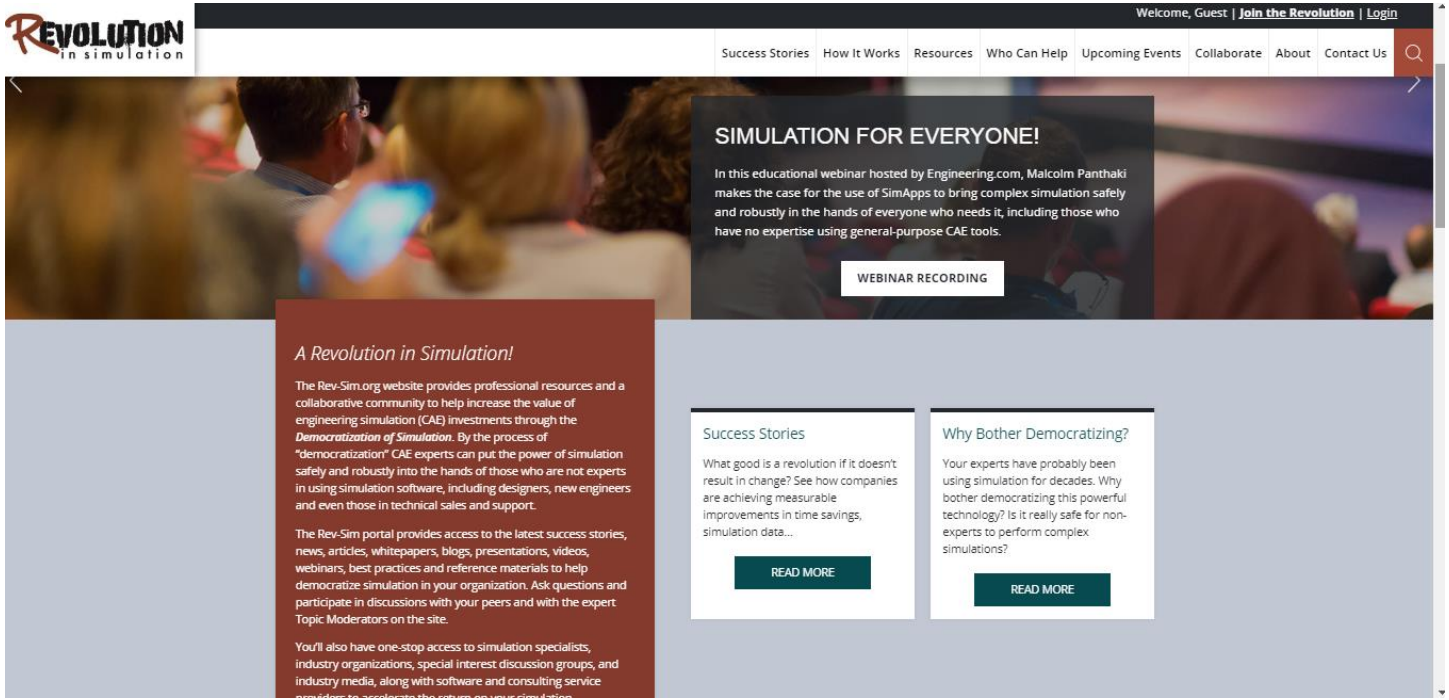
QUICK TOUR OF *REV-SIM.ORG*



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TOPIC MODERATORS (EXPERTS)

Ricardo Actis
ESRD

Democratizing Simulation

Seb Dewhurst
EASA

Automation Templates

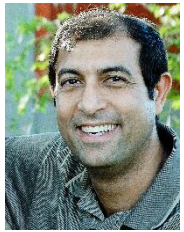
Hubertus Tummescheit
Modelon

Alan Chalker
AweSim

System Simulation

Wolfgang Gentzsch
UberCloud

Simulation Governance



Malcolm Panthaki
Aras Corporation

Juan Betts
Front End Analytics

Matt Ladzinski
NAFEMS

Simulation Apps

Joe Walsh
IntrinSim

Dennis Nagy
Beyond CAE

Democratizing HPC

Barna Szabo
ESRD

Business Challenges & ROI

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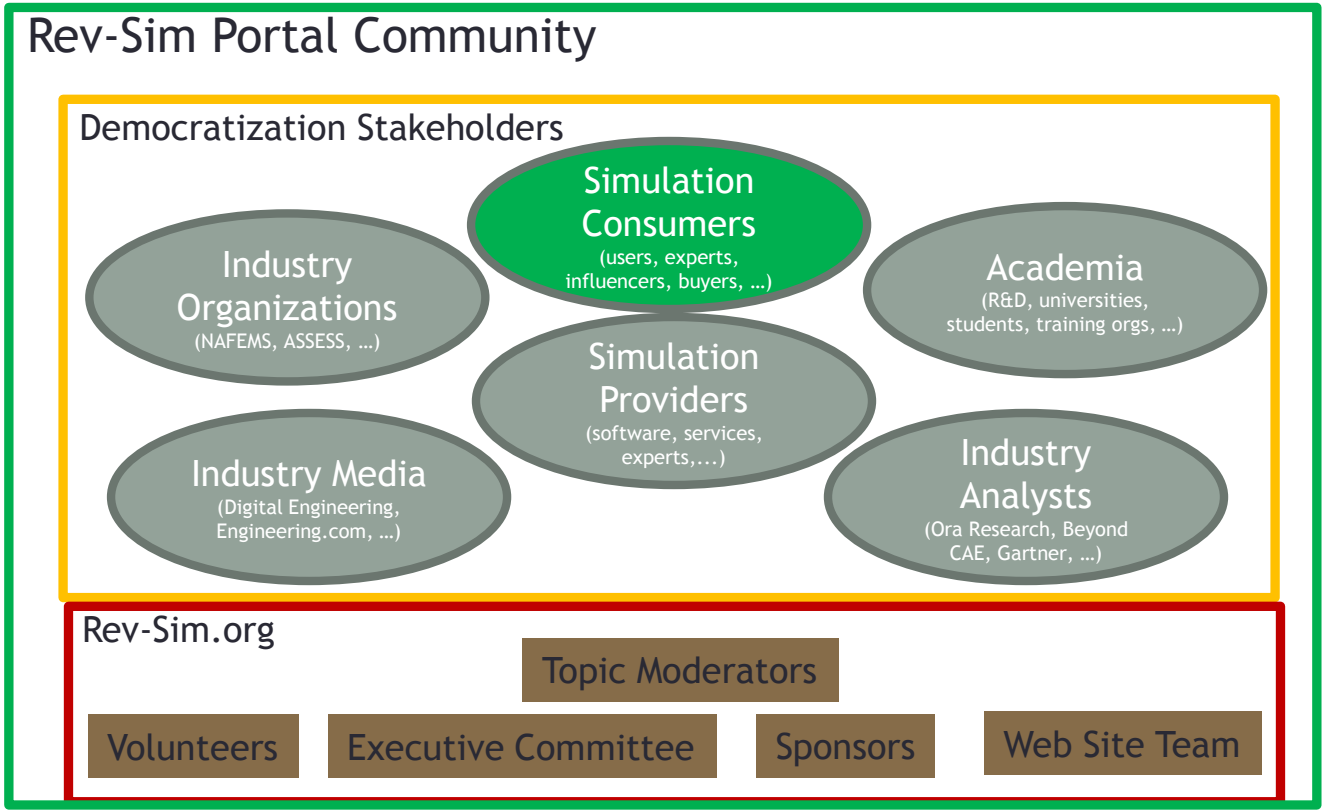
JOIN THE REV-SIM COMMUNITY



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REV-SIM SPONSORS
FUELING THE REVOLUTION

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ANALYSIS, SIMULATION AND SYSTEMS ENGINEERING SOFTWARE STRATEGIES

Comet
Simulation-Driven Design Apps

EASA
Streamline your software
Accelerate your business

esrd

Front End Analytics (FEA)
Delivering Business Advantage

kineticvision

NAFEMS

PLM Alliances

VCollab

More Coming Soon…

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CASE STUDY:
ZF (TRW) PITMAN ARM SMART GENERATOR

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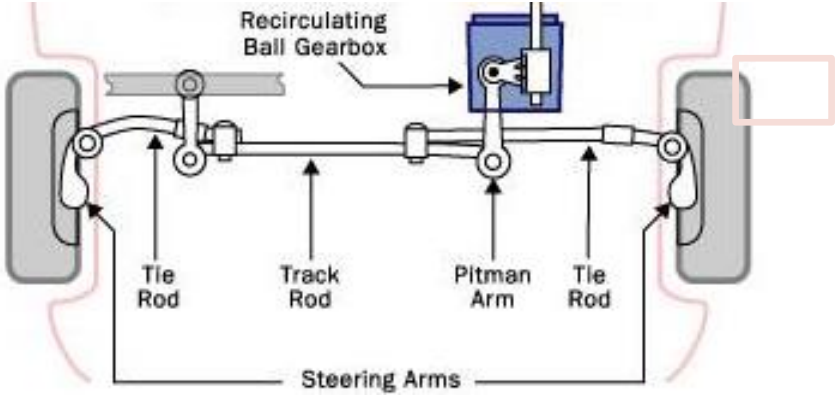
CASE STUDY: WEEKS TO MINUTES

- ZF (TRW) Pitman Arm Smart Generator
- Work performed by Front End Analytics (EASA Partner) www.feasol.com

Front End Analytics
Delivering Business Advantage



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ORIGINAL PROCESS - WEEKS, EXPERTS

- PDM/PLM
- Costing
- Excel
- CAD
- FEA (meshing, structural analysis, post processing

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ORIGINAL PROCESS - WEEKS, EXPERTS

- Requirements – customer and application engineer (AE)
- AE checks PDM/PLM for existing design
- If available, files downloaded, including alternatives (forged, machined, etc.)
- AE runs these through costing software for latest pricing
- AE produces quote

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ORIGINAL PROCESS - WEEKS, EXPERTS

If no current design available

- AE turns to “CAD” expert, searches for close match, downloads CAD file or starts anew
- Produces revised or new CAD file
- Submits to “Structural” expert. Creates Excel based parametric input data table (materials, manufacturing, etc.)
- This expert conducts FEA analysis

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ORIGINAL PROCESS - WEEKS, EXPERTS

- Submits to AE who conducts cost analysis
  - Selects lowest cost option (forged or machined)
- Produces quote and provides to customer
- Weeks, multiple experts/disciplines

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DEMOCRATIZATION - USING EASA

- EASA is a process simplification and automation tool

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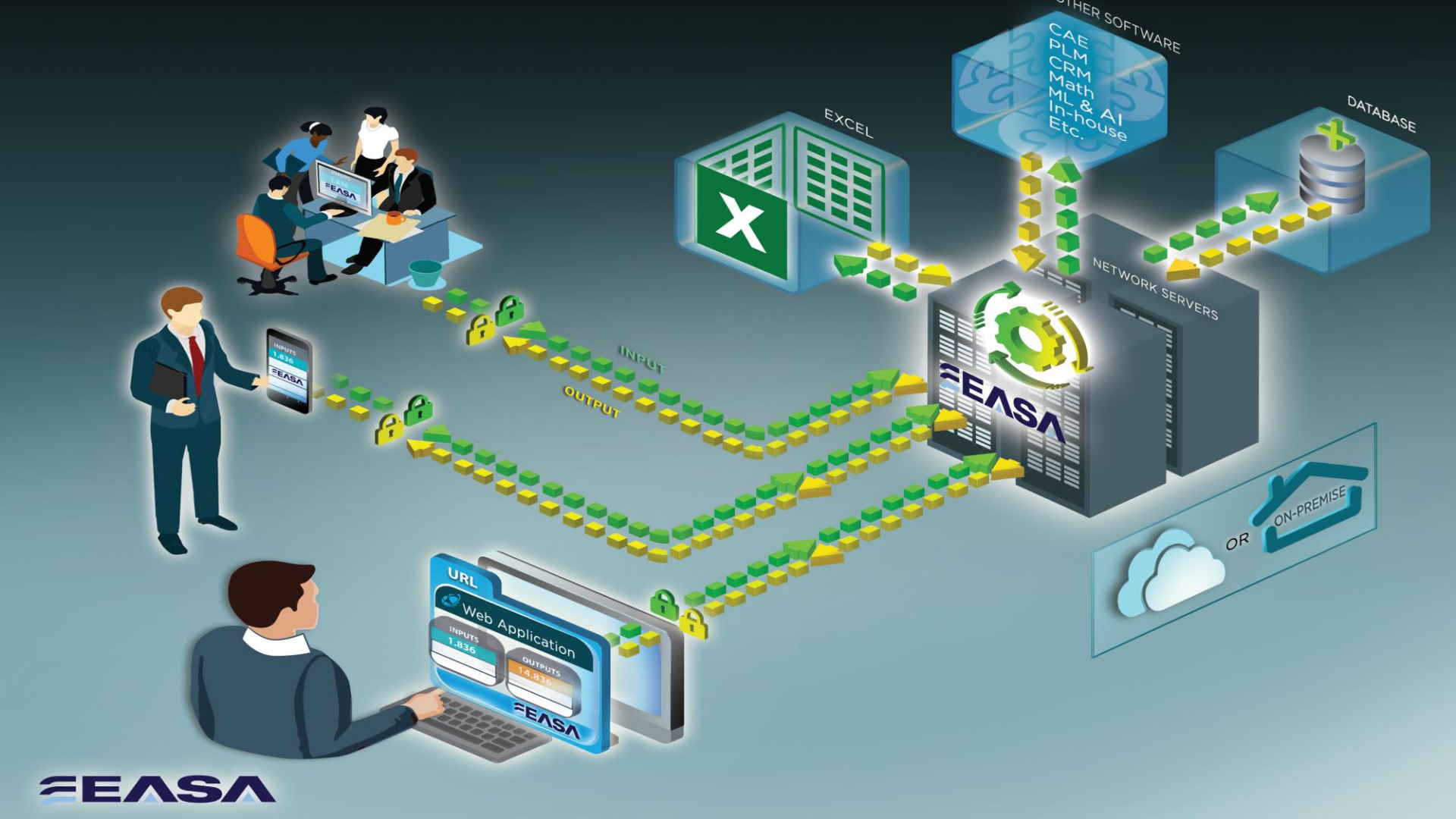
OTHER SOFTWARE
CAE
PLM
CRM
Math
ML & AI
In-house
Etc.
EXCEL
DATABASE
NETWORK SERVERS
INPUT
OUTPUT
URL
Web Application
INPUTS
1.836
OUTPUTS
14.836
OR
ON-PREMISE
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CREATE "FIT-FOR-PURPOSE WEB APP

- "Intelligent" Easy-to-Use Web App
  - Typically created by those who need the solution (users), not outsourced to IT or software developers unfamiliar with requirements
  - Logic, design rules, best practices, error correction/elimination, etc.
- Empowers non-experts – Sales/Application Engineers can generate new designs
- Automation streamlines work for expert users

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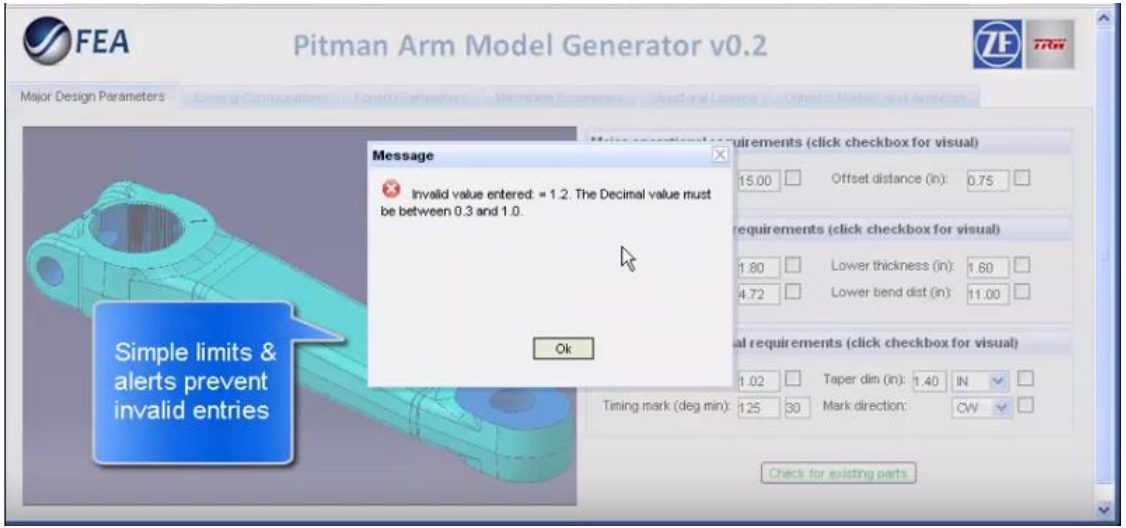
A RIDE THROUGH THE WEB APP

- Design parameters easily entered
- Error detection / correction, user guidance
- Graphical feedback from underlying software



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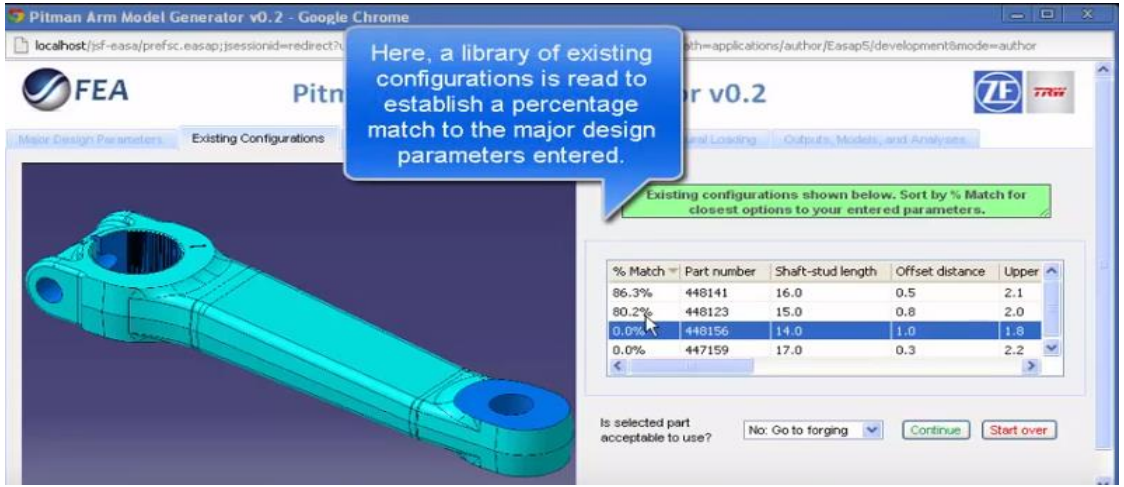
A RIDE THROUGH THE WEB APP

- Requirements matched against existing parts
- If suitable match found, part files available right away
- If no match, user proceeds with new design



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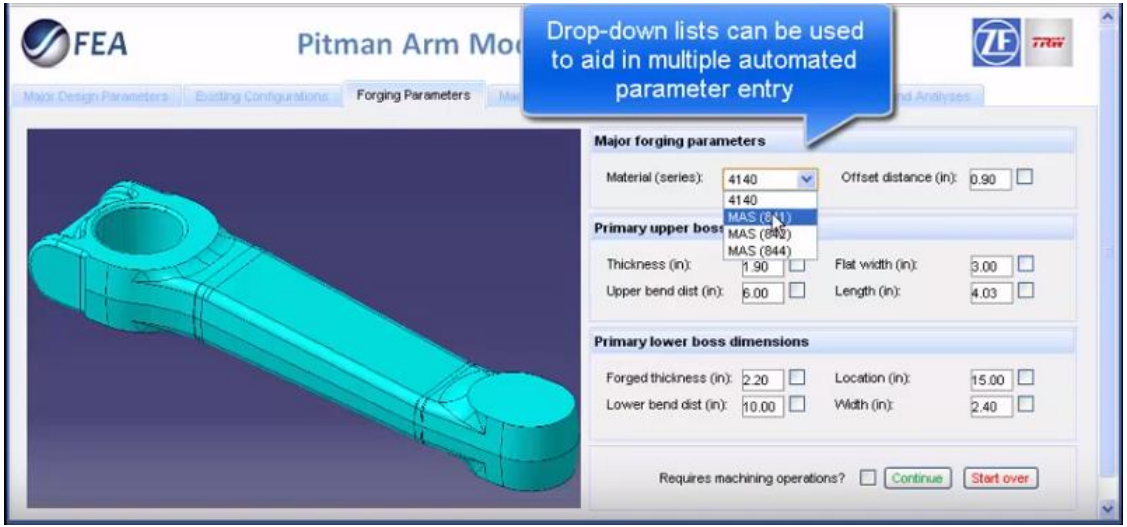
A RIDE THROUGH THE WEB APP

- New design built using parameter entry
- Forging, machining and structural loading
- CAD and structural models built automatically



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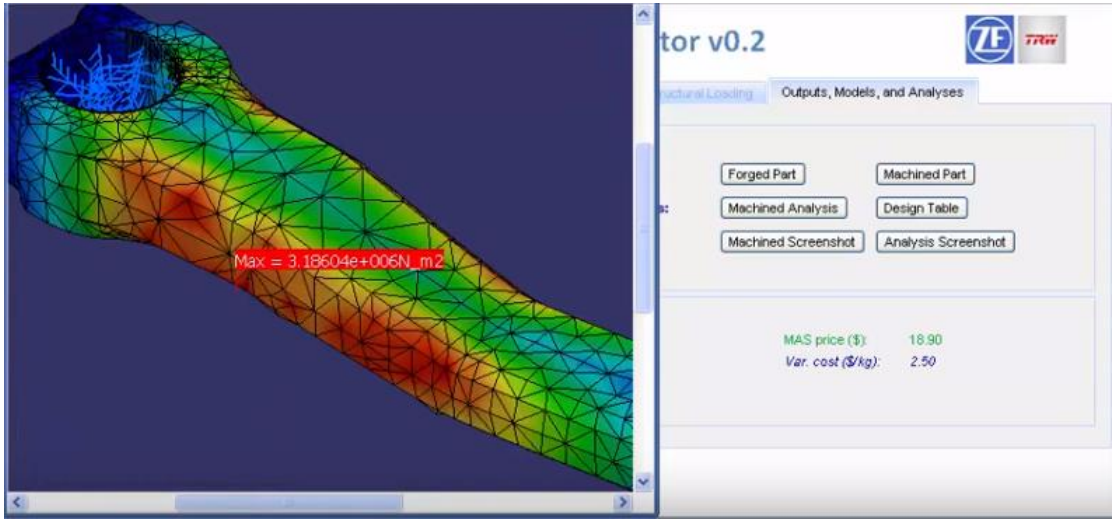
A RIDE THROUGH THE WEB APP

- Access to detailed structural analysis results
- Underlying process involves CAD, FEA and Excel



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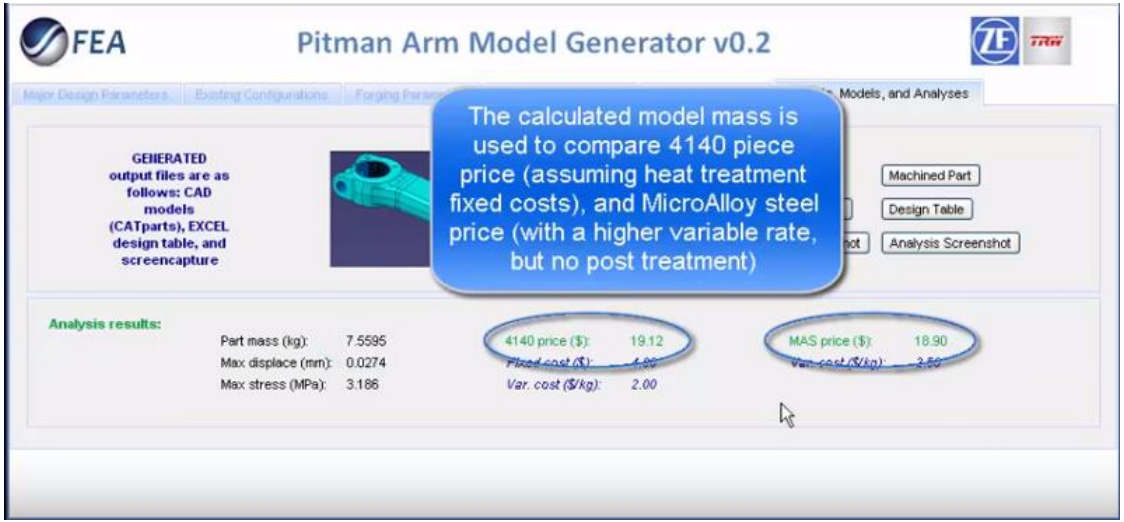
A RIDE THROUGH THE WEB APP

- Model built and structural analysis performed
- Results processed to allow direct comparison against customer requirements



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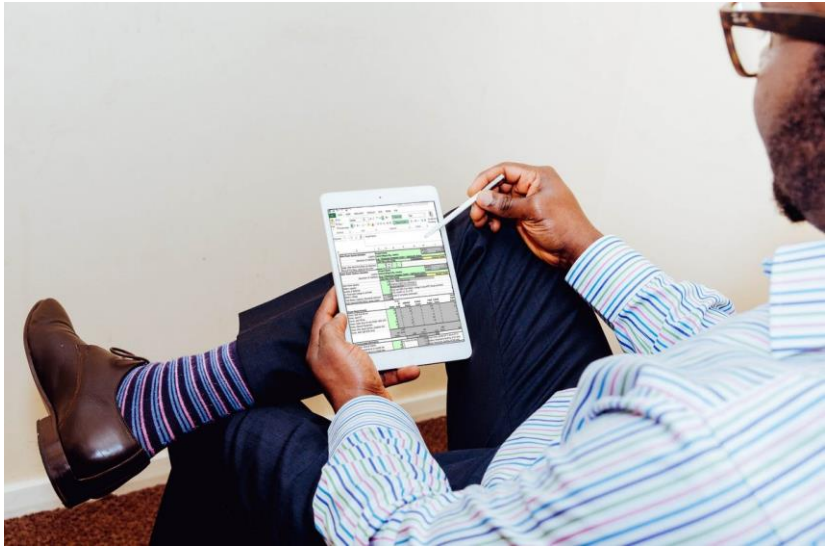
RESULT

- AE provides quote in minutes or hours compared to weeks



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OTHER APPLICATIONS

- Modernization of legacy software
- Project management with workflow control and notifications
- Transforming spreadsheet based models into secure, version controlled enterprise web apps

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SUMMARY

Non-Experts Safely Utilize Advanced Modeling & Workflows

- “Intelligent” Fit-for-Purpose Web App
- No expertise of underlying software needed
- Expert involvement and manual effort eliminated or minimized
- Time to quote reduced from weeks to minutes

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CASE STUDY:
AUTOMOTIVE BRAKE DISK ANALYSIS

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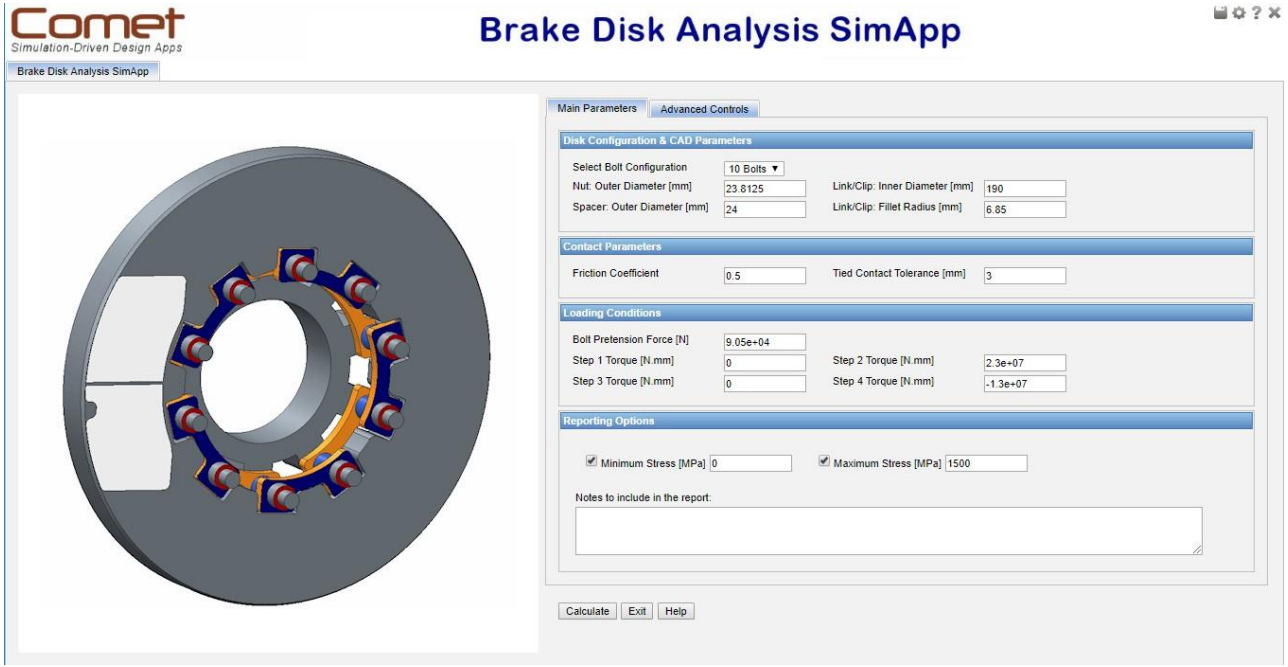
CASE STUDY: BRAKE DISK SIMAPP



Complex, nonlinear disk brake analysis for various brake configurations using 3-D CAD, fully-automatic meshing, 3-D contact, and ANSYS FEA

TOUR the SimApp…

Source: SimApp Web GUI generated using EASA

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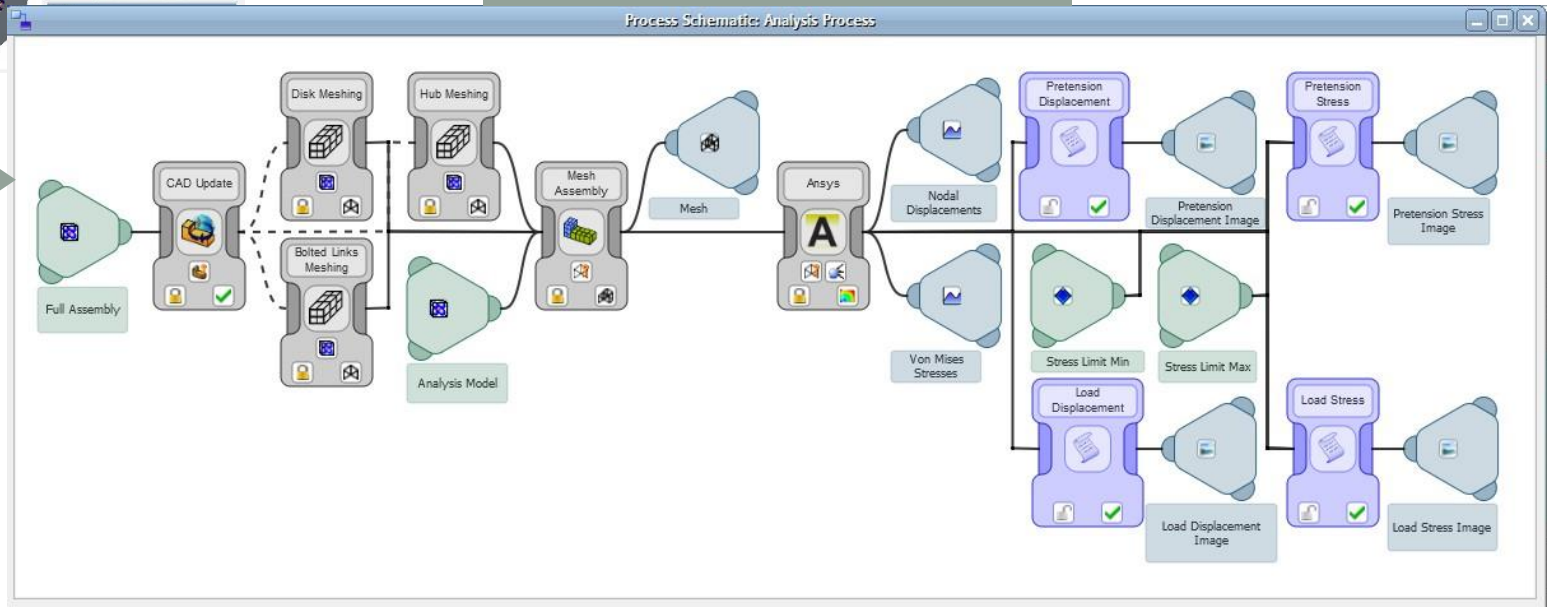
SIMULATION AUTOMATION TEMPLATE: THE ENGINE OF THE SIMAPP

SimApp

Simulation Automation Template



TOUR the *Aras Comet SPDM* Simulation Workspace…

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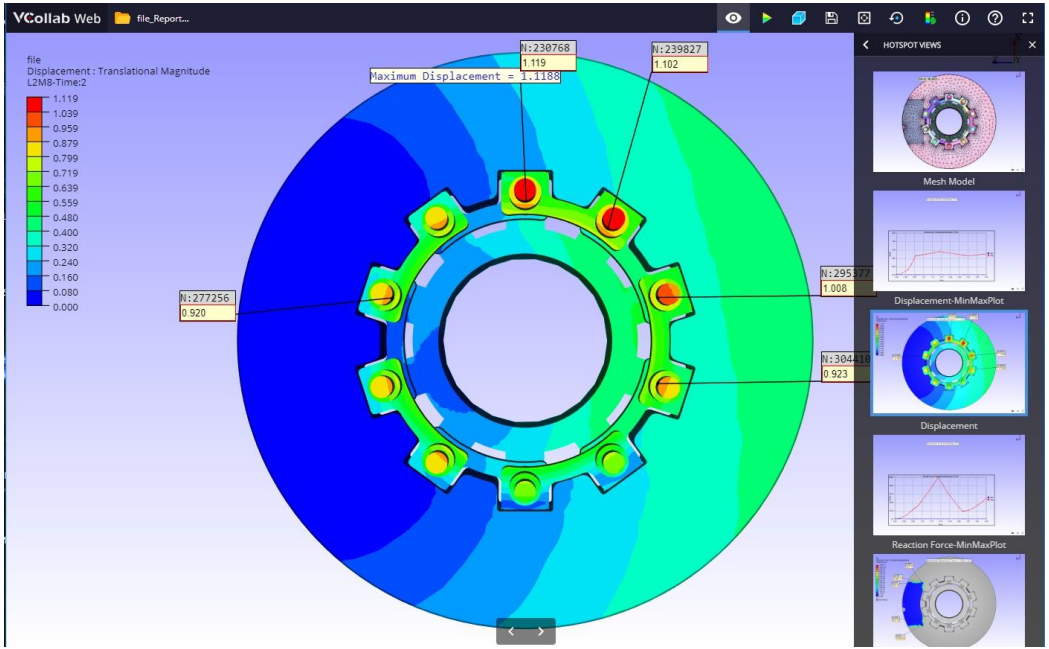
AUTO-GENERATE REPORTS SIMULATION RESULTS FOR THE ENTERPRISE



- Auto-generate reports including metadata
- Share reports on the Web across the enterprise
- Automatically track inputs with results
- Design Traceability with the Digital Thread

Source: Report generated using Vcollab

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WHY BOTHER?

Simulation for the Enterprise

- Capture and enforce best practices
- Make simulation experts more efficient – remove the administrative, tedious tasks
- Make simulation accessible to everyone who needs it, safely and robustly
- Provide enterprise access to simulation data

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3 POLL QUESTIONS

- Anonymous, results shared immediately
- See where you are compared to peers (diverse!)
- Help guide “Rev-Sim” initiatives

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Q&A SESSION

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Join the Revolution!

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