Dr. Serge Batkam

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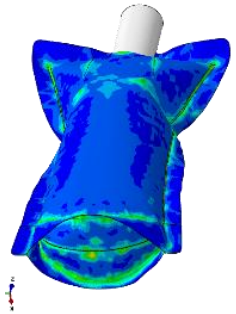
Serge BATKAM spent the last 20 years implementing virtual simulation in the Packaging industry

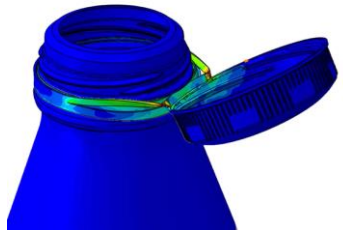
He founded PACK 3.0 with the objective of providing the industry with high-level engineering and simulation services to face the major challenges of packaging transformation

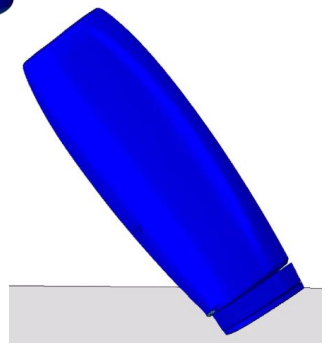
PACK 3.0: 10 years helping the industry deliver the packaging transformations

REDUCE the weight of existing containers
Without harming the technical performances



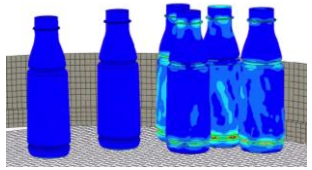
Deliver the SUSTAINABILITY goals
(PET, PCR alu, plant-based, paper-based…)



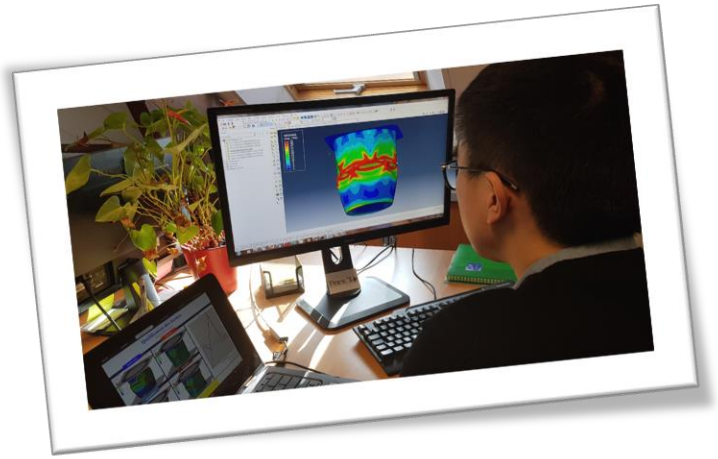


Meet the REGULATORY requirements
(EU legislation, FEA regulations, ASTM, ISTA…)

REINVENT & ACCELERATE packages development
using advanced simulation techniques



Deliver the BEST QUALITY *(industrial, logistics…)* **/ Run troubleshooting**



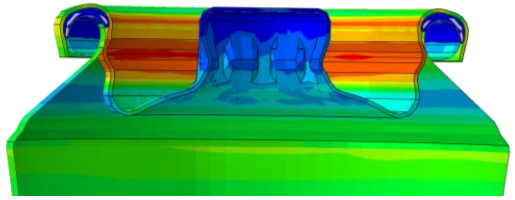
Promote VIRTUAL SIMULATION within the industry
(software, people, equipment, collaboration…)

PACK 3.0 to support the aerosol industry deliver the packaging transformations

3 cases-studies

PET aerosol

Valve & Alu cans



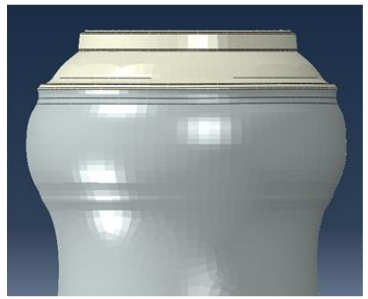
Spray performance

Help our client deliver their sustainability goals: PET for aerosol containers

- **A great innovation !**
- **A tough technical challenge**: **meet the performance requirements requested by aerosol regulations** (*resistance to filling pressure, resistance to extreme temperature, burst test, drop-test, etc.)* ?

Help our client deliver their sustainability goals: PET for aerosol containers

Virtual simulation methodology implemented by PACK 3.0 engineers in 3 steps



Pictures and testing results with authorization of M. Farnault (L'Oreal, Dispensing & Aerosol, Packaging Expertise)

Step 1: **Build a robust simulation model** of PET aerosol

Step 2: **Use the model to understand and explain** the troubles encountered

Step 3: **use the model to re-engineer the PET aerosol container**

Help our client deliver their sustainability goals : PET for aerosols

Physical Test

Virtual Simulation

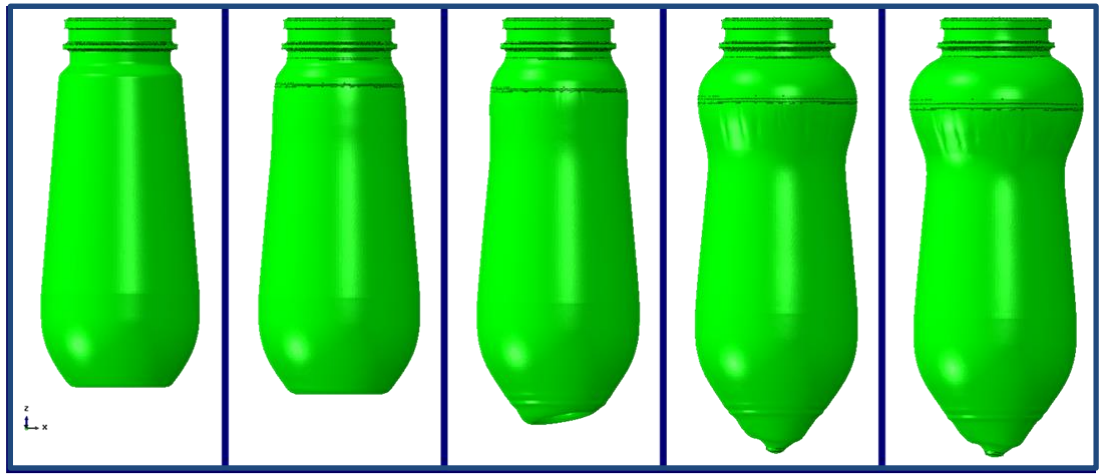
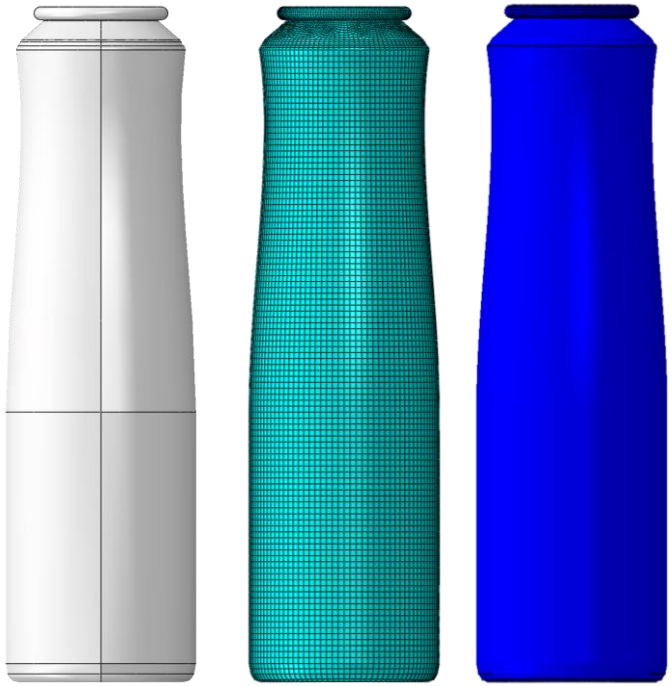


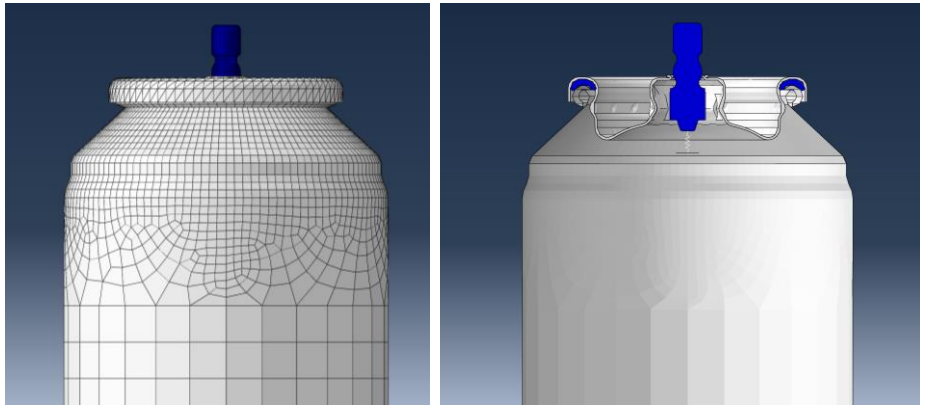
Illustration: simulation of the resistance of PET aerosol to extreme high temperature
Aerosol initially filled with appropriate gas at nominal pressure

Pictures and testing results with authorization of M. Farnault (L'Oreal, Dispensing & Aerosol, Packaging Expertise)

Thanks to advanced virtual simulation models, PACK 3.0 helped Ushuaia Engineers optimize the main engineering parameters of their new PET aerosol container: bottle geometry, preform weight, material distribution, local properties of PET specific resin grade, etc.

Help our client deliver the regulatory requirements: valve & alu cans





FEA Standard	Filled aerosol packs – Simplified method to measure mechanical resistance of metal and plastic containers fitted with valve	FEA 623 E 10/2014 Page 2/5

FEA 225	Aluminium aerosol containers - Dimensions of rimmed aluminium aerosol c
FEA 226	Plastic aerosol containers – Guideline for achieving optimum external crimp with 25.4 mm opening
FEA 401	This standard is replaced by EN 14850
FEA 405	Aerosol containers – Definition and method for measuring parallelism
FEA 406	Aerosol containers – Definition and method for measuring the planeless of t
FEA 421	Aerosol containers with 25.4 mm opening – Definition and measurement of
FEA 422	Filled aerosol packs – Standard fill levels
FEA 602	Filled aerosol packs – Rapid test of the tightness of valve mechanisms and containers with 25.4 mm opening
FEA 603	Filled aerosol packs – Guidelines to test long-term preservation and to mea
FEA 604	Filled aerosol packs – Measurement of the internal pressure
FEA 605	Filled aerosol packs – Measurement of the density of aerosol formulations
FEA 606	Filled aerosol packs – Water bath testing – Verification of conformity with le
FEA 608	this standard is replaced by point 6.3.3 of the annex to the Aerosol Dispens
FEA 609	this standard is replaced by point 6.3.1 of the annex to the Aerosol Dispens
FEA 610	this standard is replaced by point 6.3.2 of the annex to the Aerosol Dispens
FEA 615	Glass aerosol containers – Drop test
FEA 621	Aerosol containers – Measurement of internal pressure resistance of empty
FEA 623	Filled aerosol packs – Simplified method to measure mechanical resistance containers fitted with valve
FEA 641	Aerosol gaskets – Test for material selection
FEA 642	Aerosol gaskets – Olfactive control test

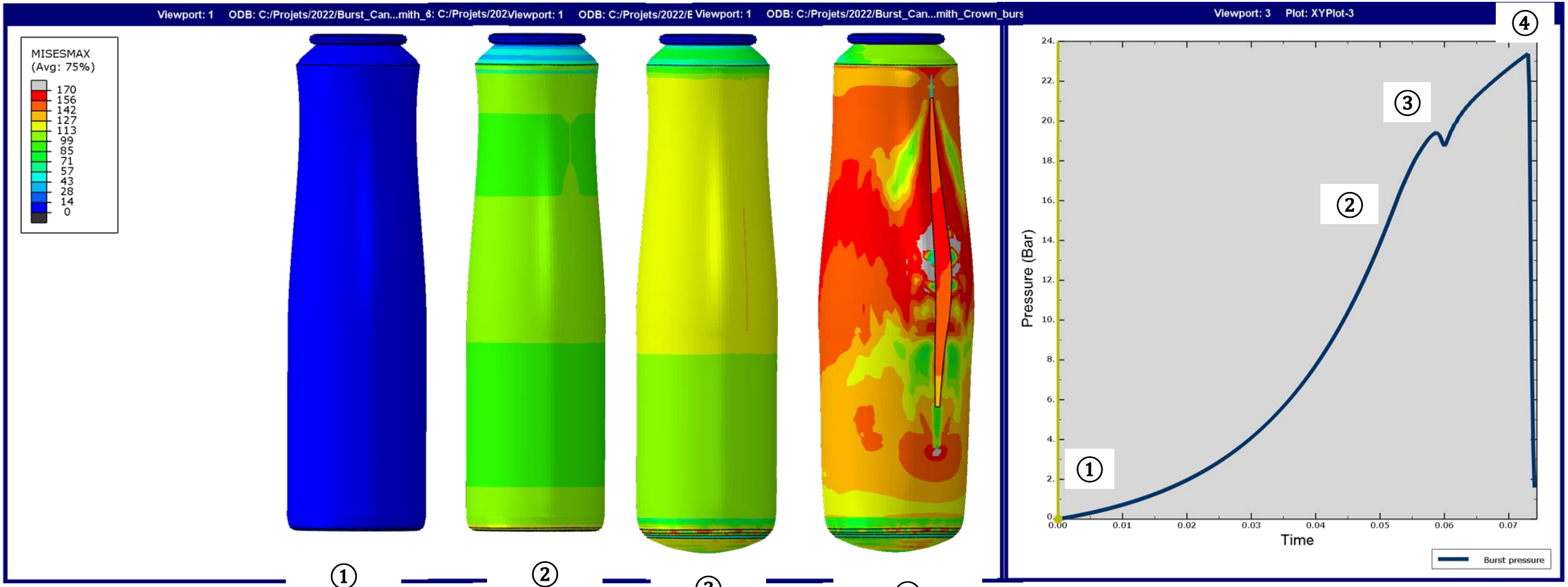
Reference: FEA standards

Challenges to PACK 3.0 engineers

- Will the alu can resist the FEA regulations tests ?
- FEA 621/ 623: will the valve and alu can resist the **hydraulic pressure "burst test" ?**
- Is it **possible to lightweight the alu** can without harming its performance?

Help our client deliver the regulatory requirements: valve & alu cans

Virtual simulation of the FEA 621 test



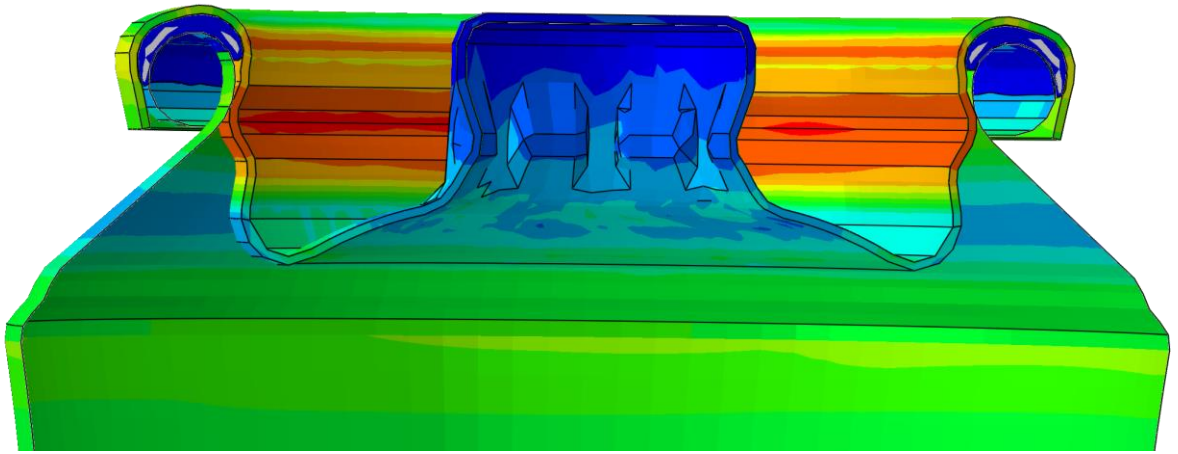
① ② **③ Bottom reverse 20ar** **④ Breakage 24Bar**

*Color code : **Mises Stress***
Truncated scale [0-170MPa]

Without the valve: the alu can well resist the hydraulic pressure (up to 20bar, before breakage occurs)

Help our client deliver the regulatory requirements: valve & alu cans

Physical can

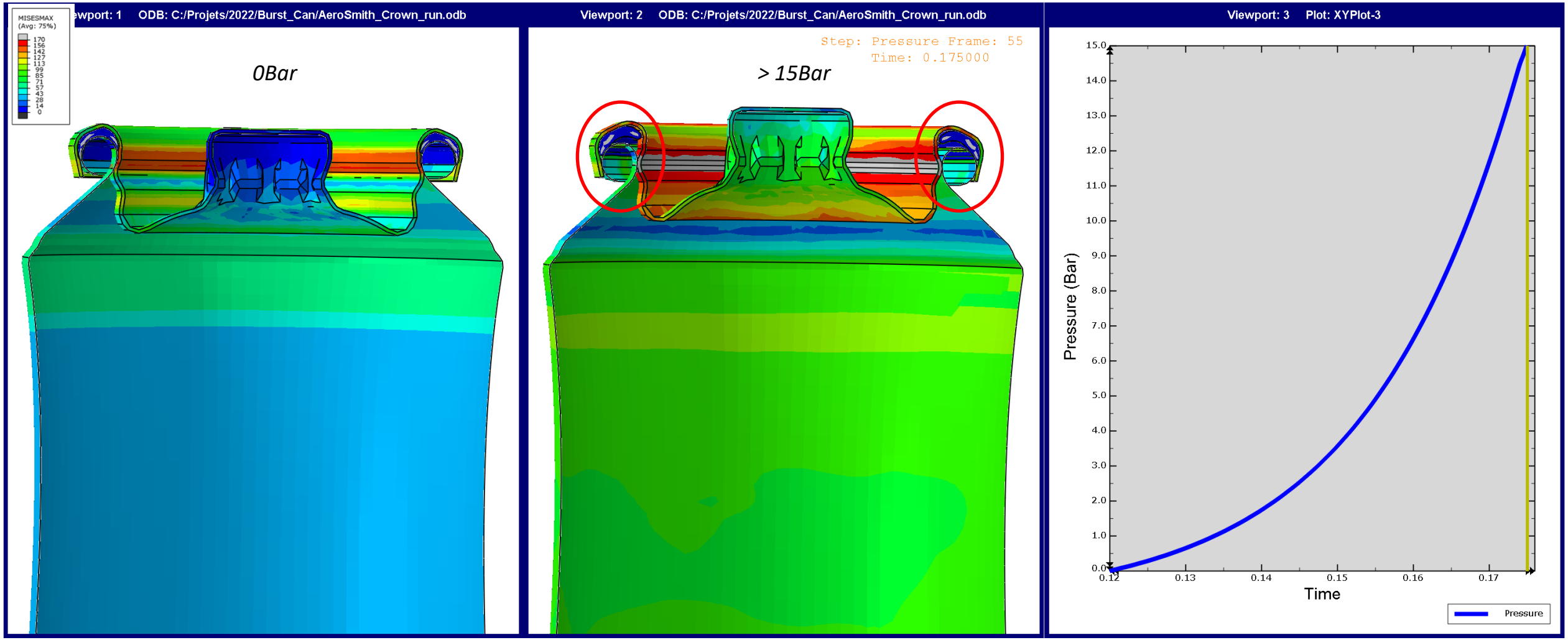


Virtual simulation

Virtual simulation is used to support the development of sustainable and robust aerosol containers

Help our client deliver the regulatory requirements: valve & alu cans

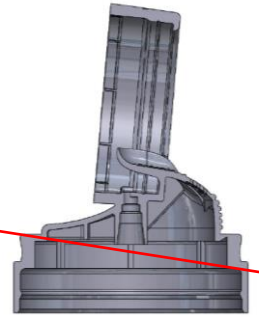
Virtual simulation of the FEA 623 test

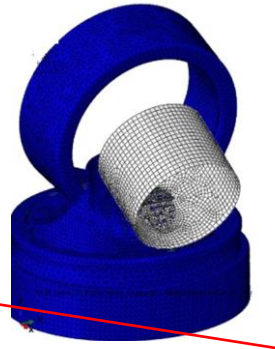


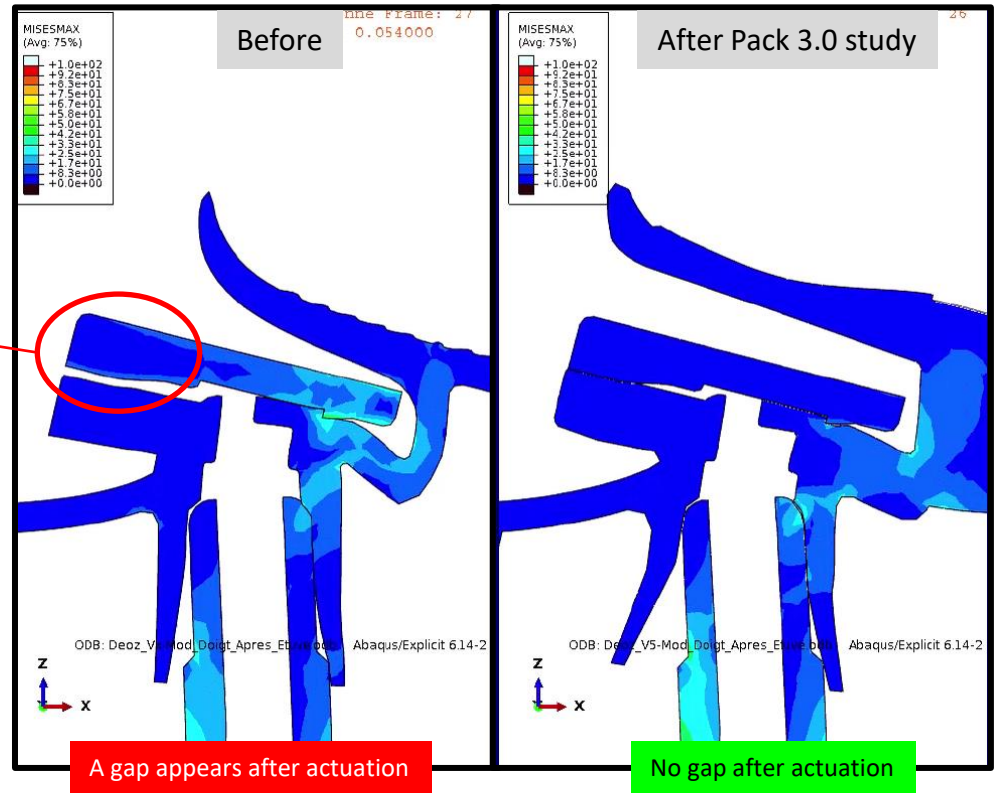
With the valve: the alu can do not pass the FEA 627, as the valve is ejacted ~15bars

*Color code : **Mises Stress***
Truncated scale [0-170MPa]

Help our client deliver the best quality – spray performance







Challenges to Pack 3.0

- ❑ **Over time, the performance of the aerosol degrades, and the product no longer comes out through the spray nozzles**
- ❑ **Analysis: after actuation, a gap appears between the blue and white parts, because of uncontrolled deformation (resulting from complex Multiphysics phenomena: formula, temperature, ageing …)**
- ❑ **Using advanced simulation techniques, Pack 3.0 engineers help solve this issue !**


ANY PACKAGING
ISSUE
?
We can help !