

Grid users in the Baltic countries (crashing planes virtually)

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- **OUTLINE**

- Main reasons for GRID attraction
- Which aspect makes GRID unfriendly for user?
- A Case study - ANSYS GRIDification
- Structural analysis examples – crashing of aeronautical structures

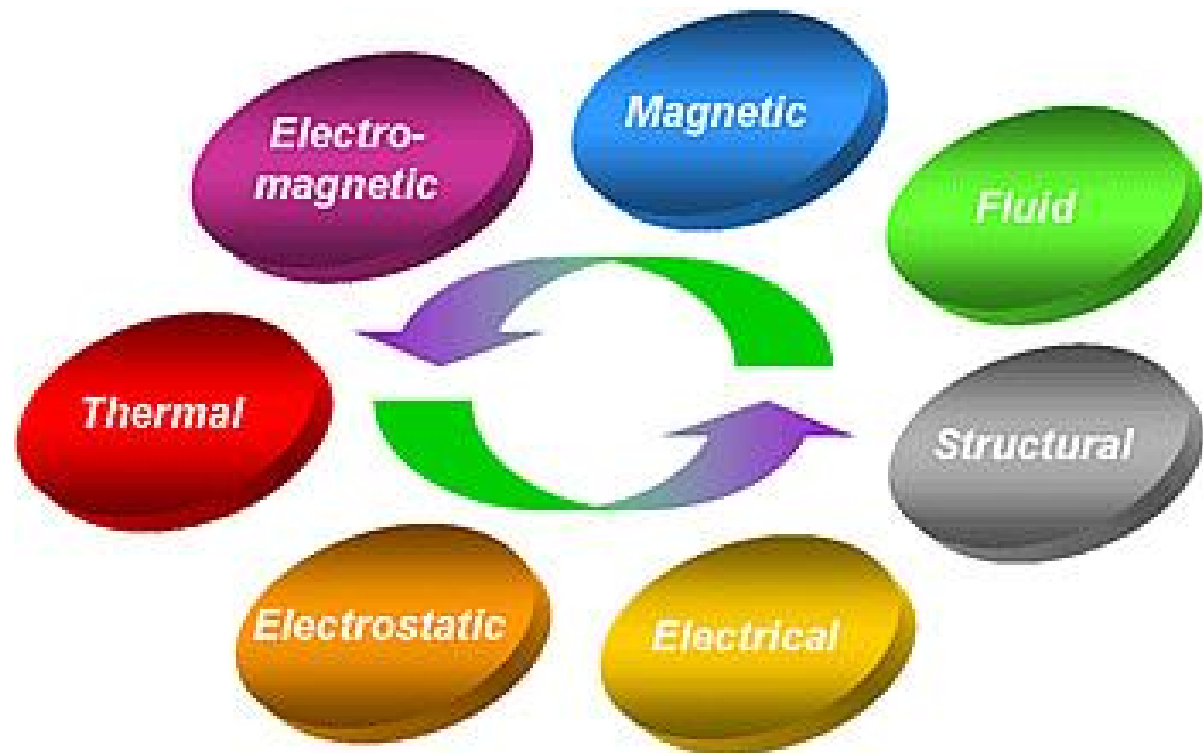
Main reasons for GRID attraction?

- 1) Outsourcing of the computational power for the solution intensive research. (Nonlinear - multihysics analyses).
- 2) More extensive *What if elaboration?*
- 3) Flexibility to submit and to obtain analysis.
- 4) To aim for more complex/ multidisciplinary problems

Which aspect makes Grid unfriendly for user?

- 1) Complicated and non user friendly environment especially from none IT disciplines. (User manual is not an option).
- 2) Non-traceable state of the solution. (Magic box for the user).
- 3) Time consumption just for setting up the problem can be comparatively too high. (Done by experts only).

- Commercial finite element code - ANSYS for structural engineering applications with physical validation.



Implementation of ANSYS in Grid thought the Migrating Desktop tool

The screenshot displays the Migrating Desktop web portal and several software windows. The web portal features a navigation menu on the left with buttons for HOME, NEWS, IDEA, APPLICATIONS, USER GUIDE, DEVELOPER ZONE, PUBLICATIONS, CONTACT, FAQ, and LINKS. The main content area includes a central banner for 'Migrating Desktop' and a 'Job Monitoring Dialog' window at the bottom left.

The 'Job Monitoring Dialog' window shows a table of job execution details:

Name	ID	Status	Submitted At
ANSYS_LS-DYNA	https://grid3.mit.vu.lt:9000/U9ib...	Done	Aug 29, 2007 8:36:15 PM
ANSYS_LS-DYNA	https://grid3.mit.vu.lt:9000/8wIF...	Done	Aug 29, 2007 8:36:15 PM
ANSYS_LS-DYNA	https://grid3.mit.vu.lt:9000/sZco...	Done	Aug 29, 2007 8:36:15 PM
ANSYS_LS-DYNA	https://grid3.mit.vu.lt:9000/5Tgk...	Running	Aug 29, 2007 8:36:15 PM
ANSYS_LS-DYNA	https://grid3.mit.vu.lt:9000/0yL...	Running	Aug 29, 2007 8:36:15 PM
ANSYS_LS-DYNA	Temporary id: 11895680614910...	Submitted	Aug 29, 2007 8:36:15 PM

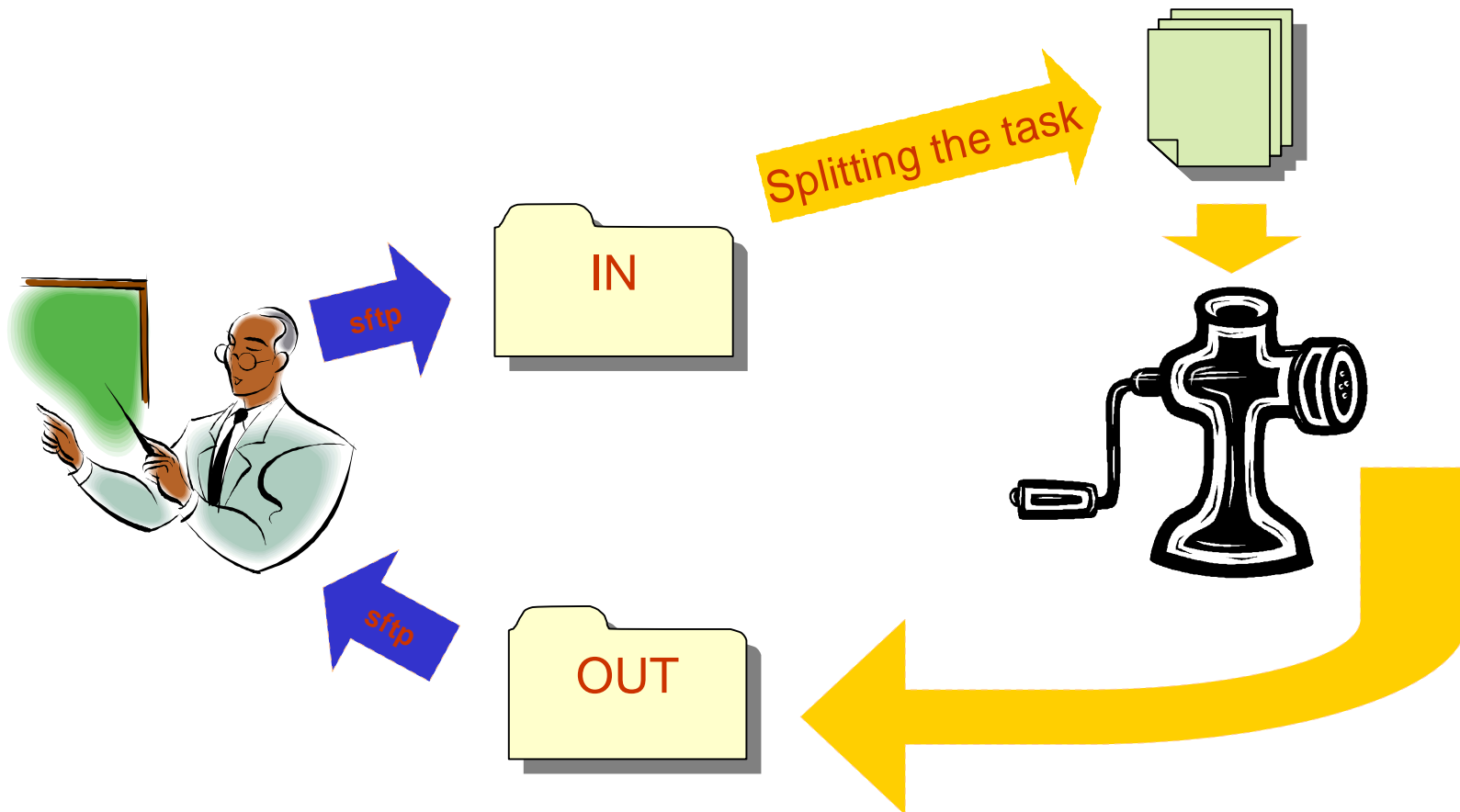
Below the table, it indicates 'Total Jobs: 6' and 'Selected Jobs: 0'. Buttons for 'Select All', 'Unselect All', 'Invert sel.', 'Details', 'Cancel', 'Delete', 'Visualize', 'Reset', 'Update', 'Close', and 'Help' are visible.

Overlaid on the right is a 'Job Submission Wizard' window with tabs for Arguments, Description, Resources, Files, Environment, and Tools. The 'Files' tab is active, showing a table of file paths and types:

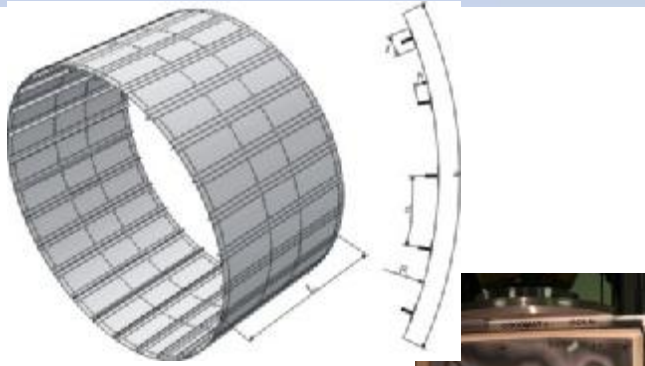
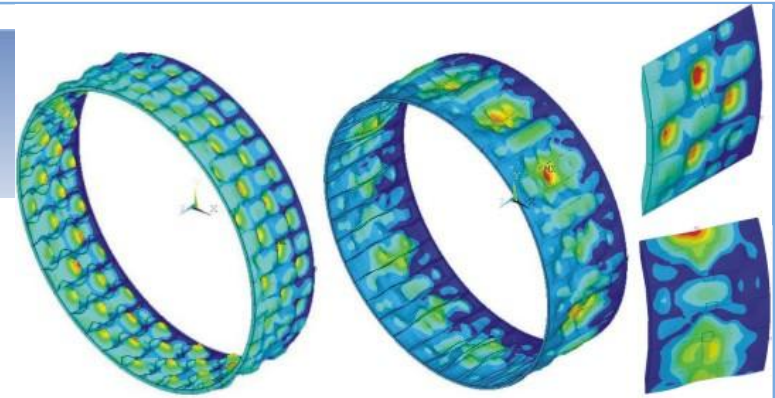
Name	Path	Type	Refresh
StdInput		in	
StdOutput	VirtualDirectory/1/StdOut.txt	out	
StdError	VirtualDirectory/1/StdErr.txt	out	
ls-dyna_perfor...	VirtualDirectory/ansys-node.tgz	in	
IN_1.txt	VirtualDirectory/1/IN_1.txt	in	
ansys-node.tgz	VirtualDirectory/1/ansys-node.tgz	in	
bndout1_1.txt	VirtualDirectory/1/bndout1_1.txt	out	
messag	VirtualDirectory/1/messag	out	

Buttons for 'Add', 'Remove', 'Submit', 'Save', and 'Close' are present at the bottom of the wizard.

Implementation of ANSYS in Grid thought the LU MII Gridification tool (Grinder)



Metamodelling methodology

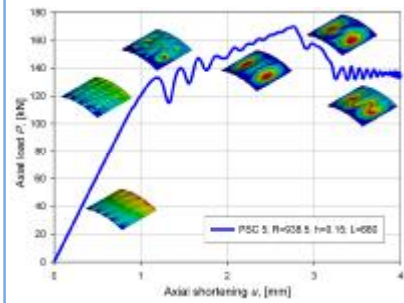
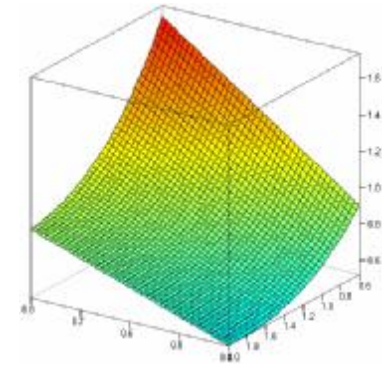


Domain of interest
Fixed design input variables

Design and evaluation of computer experiments
FEM, multibody dynamics

Design and evaluation of natural experiments

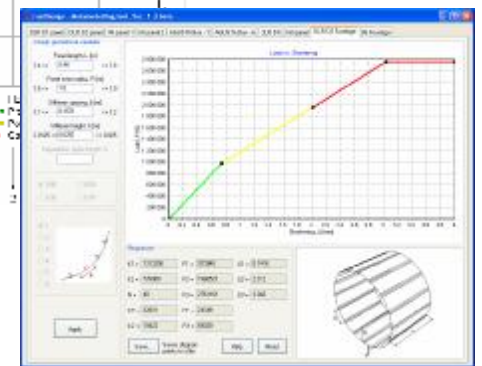
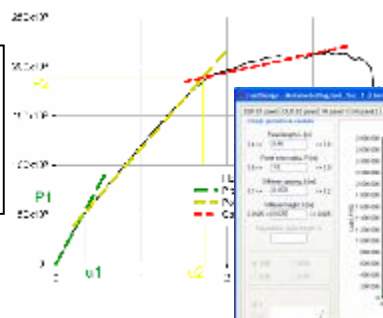
Identification of the pre-buckling and post-buckling behaviour
Piece-wise linear approximation



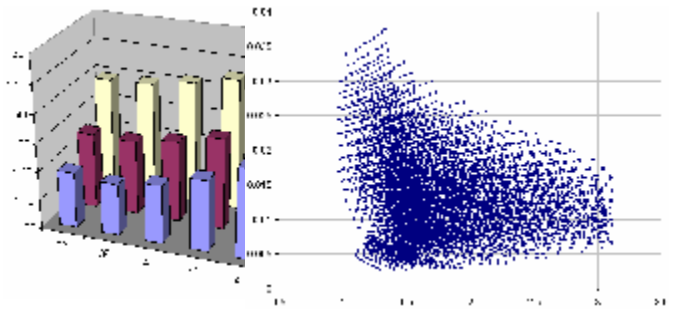
Validation and verification
Shrinkage of search region

Metamodel building
Different parametric and non-parametric approximations

Input-output data

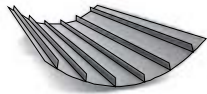


Design guidelines
Parametric sensitivity
Weight savings





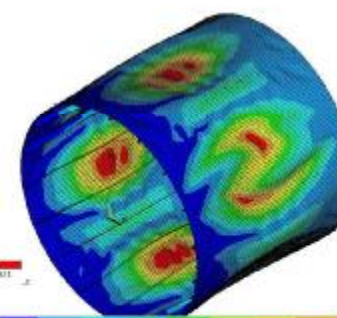
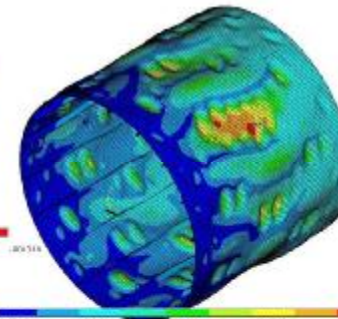
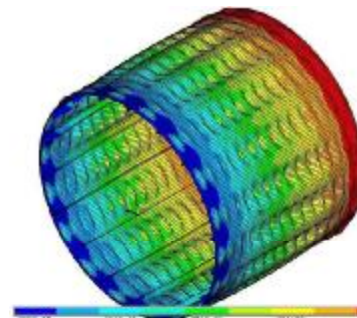
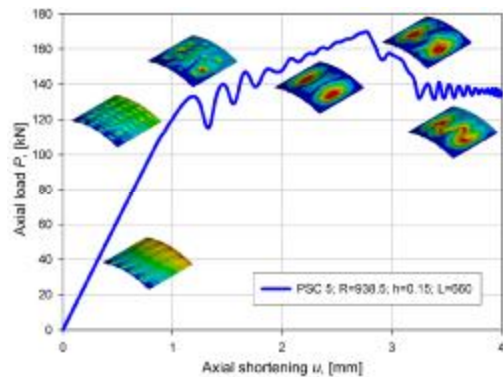
COCOMAT



**Next generation –
All composite fuselage structure**



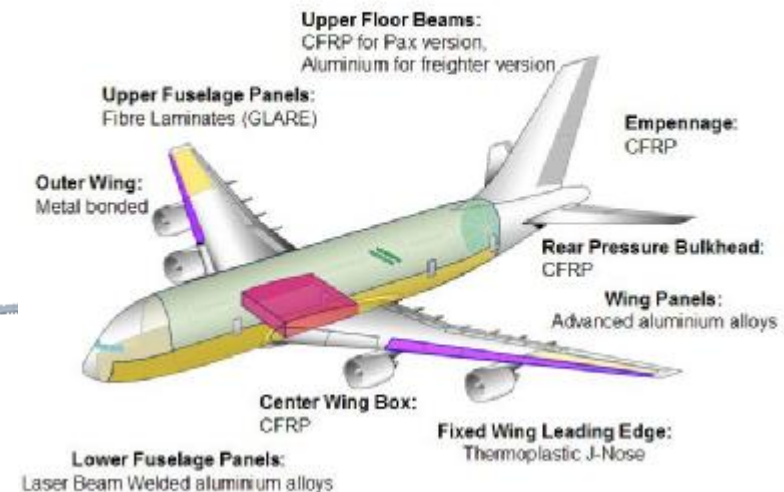
A curved CFRP panels which are understood as parts of a fuselage section.

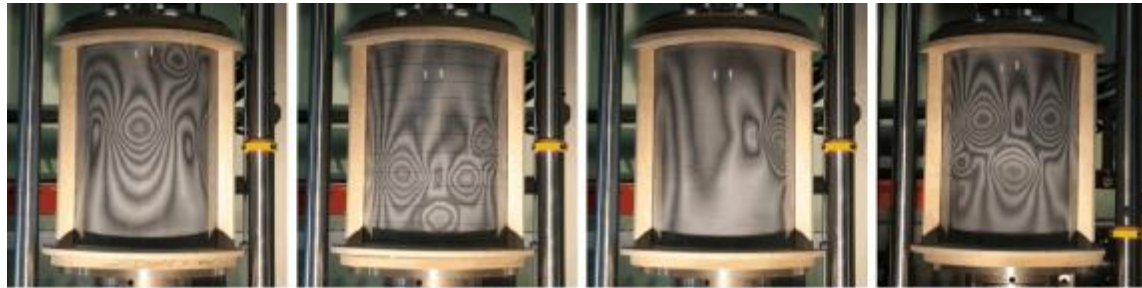


- The context of European industrial competitiveness and sustainable development
 - Future possibilities of application of composite materials in primary structures
 - Need of redefining of design guidelines compared to those used in conventional metal structures
 - Development of new type tool's capable of fast and reliable structural dimensioning



A3XX Scenario for Advanced Materials



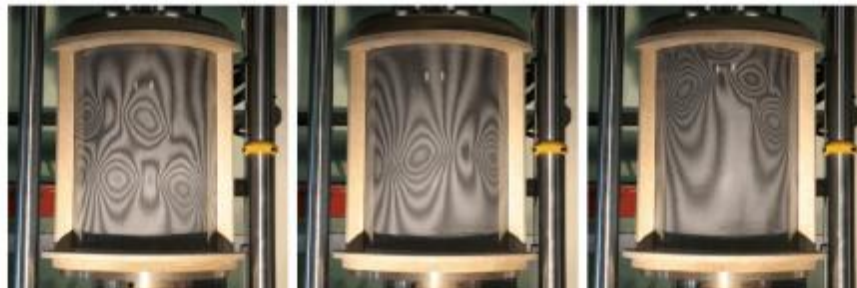
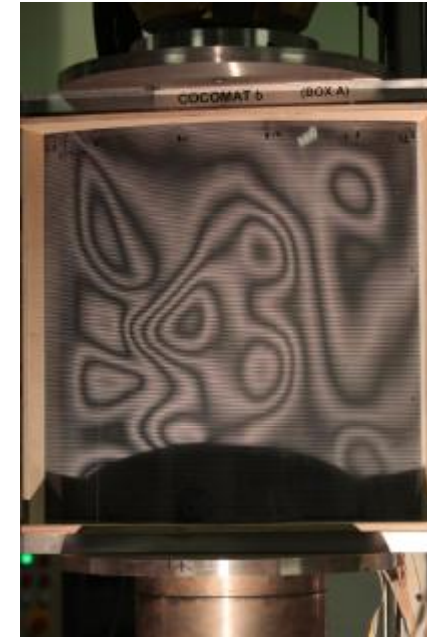


RTU #1-1

RTU #1-2

RTU #1-3

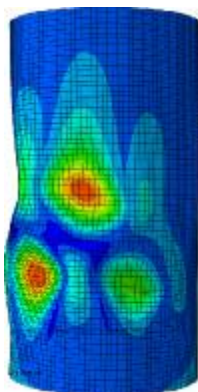
RTU #1-4



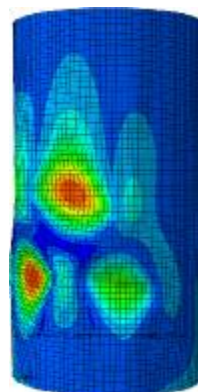
RTU #1-5

RTU #1-6

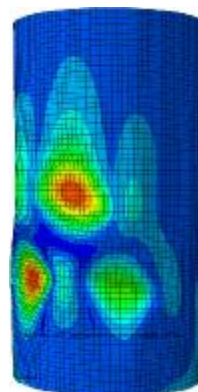
RTU #1-7



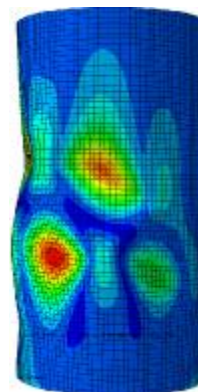
No imperfection



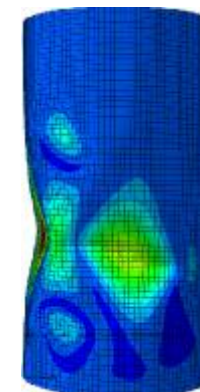
Imperfection amplitude $1/8$



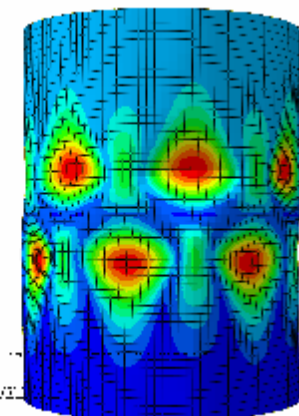
Imperfection amplitude $1/4$



Imperfection amplitude $1/2$



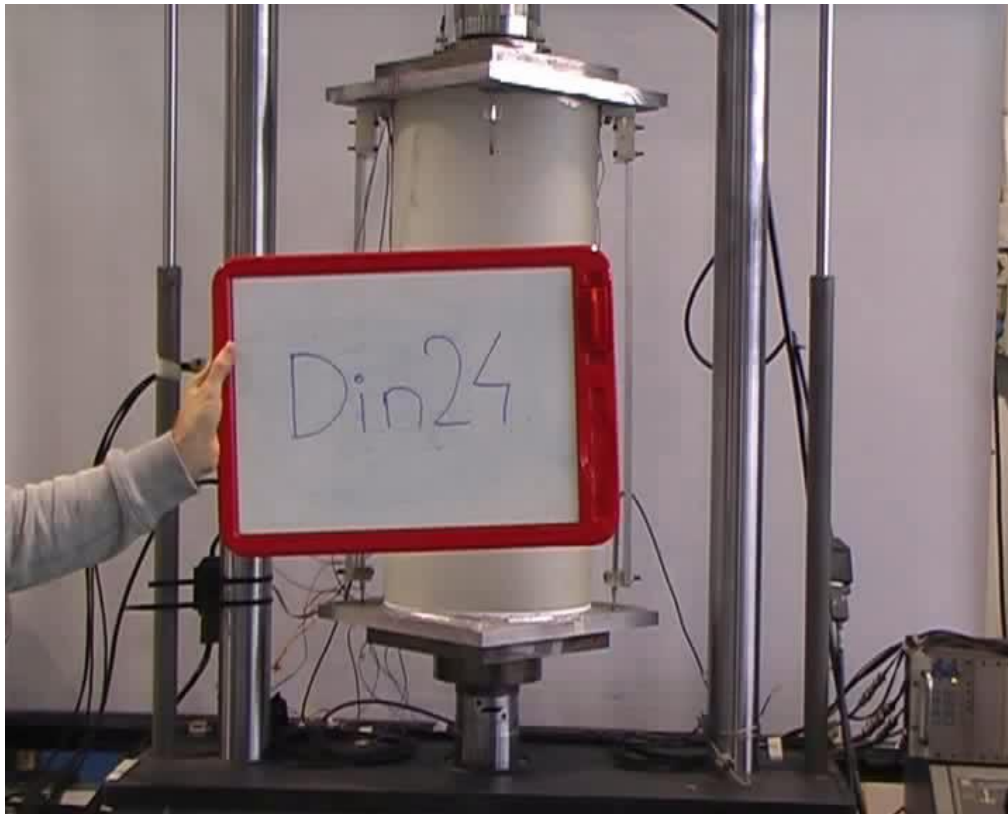
Imperfection amplitude 1



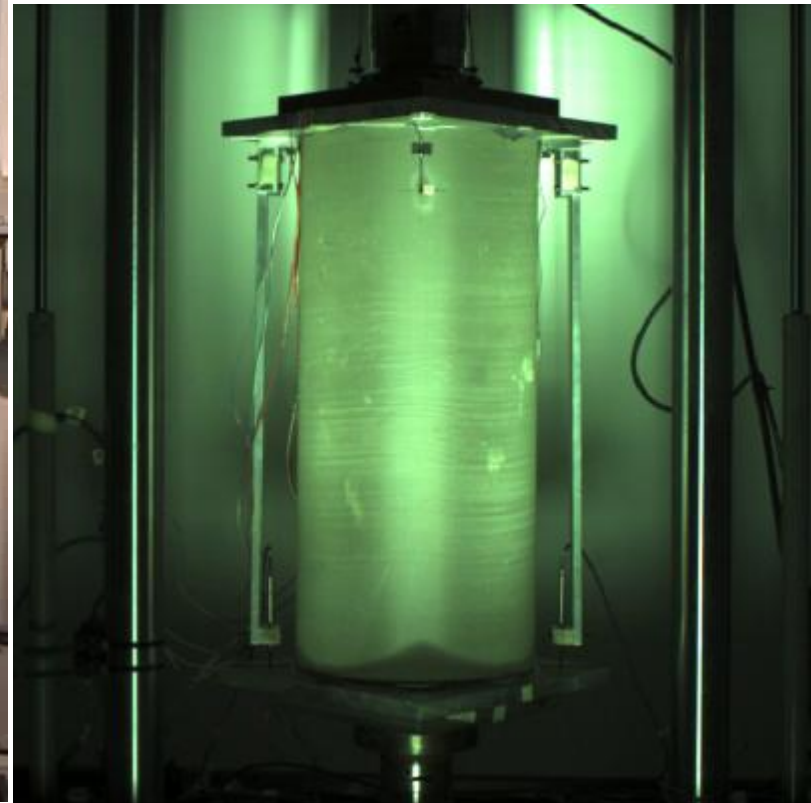
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Dynamic buckling tests

Specimen 1
Real time



Specimen 1
High-speed camera



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