SHAPER
PARAMETRIC MODELLING FOR NUMERICAL SIMULATION

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OUTLINE

Project overview
Current GEOM module
New SHAPER module
Demonstration (video)
Conclusion
4-year project financed equally by EDF and CEA

2013: pre-study to use parametric API of OCCT.

2014: specifications, first features, architecture validation.

2015: new features to make industrial shapes.

2018: first delivery to users.

after 2019 (to be adjusted): GEOM removal.
Pros:
- Simple interface: easy to learn and make simple shapes
- Partition: ensures to have shared faces to have a conform mesh
- Groups: easier definition of materials and boundary conditions on the mesh
- Python scripting:
  - Easy to learn
  - Dump study
  - Basic parameters management: user has to deal with topology modifications
  - Complex shapes (with complex scripts)

Cons:
- Hard to make complex shapes in GUI
- Cannot edit the parameters of a shape
- No parameters management in the engine
- Poor 2D-sketcher (no constraints solver, no dimensions)
- Groups are lost after each operation and must be retrieved again
- Obsolescence of code architecture (new functionalities cost too much to integrate)
Variational: interactive sketch with dimensions and constraints, draw what is on the technical drawing.

Parametric: each parameter of a shape can be edited, the final shape is automatically updated.

CAD for simulation: shapes are designed to be meshed conformally, groups definition.
Pipe flange (1/8\textsuperscript{th}).

Section of revolution

Final part
With SHAPER, you will be able to:
- design complex shapes in GUI
- get conformal meshes
- edit your shape:
  - change any of its parameter
  - add/remove details
  - make sensitivity analysis on the parameters
- create your own features via python or C++ plugins.

Can’t wait until 2018?
- join the beta-testers
- give us more use-cases
Features completion:
- features from GEOM (for iso-functionality)
- 3D primitives for CSG modelling (for Monte-Carlo codes: TRIPOLI4, MCNP…)
- measures, inspection

Management of mixed-dimension shapes:
- edges, faces, solids
- use case: structural analysis

API for python scripting and python dump

Ergonomics

Make more complex shapes
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and the other developers