

# *OpenFOAM Turbomachinery Working Group*

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# *Outline of the presentation*

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- **Context**
- **Objectives of the OF turbomachinery WG**
- **Strategy**
- **Identification of potential joint activities**
  - **Examples**
  - **Focus for the near future**
- **Official kick-off**
- **Next meeting**

# Context

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- **OpenFOAM available as OpenSource since december 2004**
- **Specific developments required for turbomachinery applications**
- **Collaboration already existing within the hydraulic turbines field**
- **OpenFOAM is a great framework for research and collaboration**

# *Objectives of the OF Turbomachinery WG*

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- **Develop OpenFOAM for turbomachinery applications, including pre-processing, solution methods, and post-processing.**
- **Provide tutorials on how to produce accurate results using OpenFOAM in turbomachines.**
- **Distribute relevant validation test cases and corresponding OpenFOAM applications.**
- **Use OpenFOAM to develop Best Practice Guidelines for CFD in turbomachines.**
- **Connect people with the same interest: OpenFOAM and turbomachinery.**

# Strategy

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- **Description of current activities.**
- **Identification of potential joint activities.**
- **Sum up relevant information regarding OpenFOAM in turbomachinery in the Wiki.**
- **Distribute developments, tutorials, validation test cases and Best Practice Guidelines to the OpenFOAM community.**
- **Organize meetings, workshops and collaborations.**

# Identification of potential joint activities

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➤ **Level of collaboration:**

<b>S</b>	<b>ready to Share the development, improvements by others is encouraged</b>
<b>D</b>	<b>working on the Development or interested to participate to the development</b>
<b>T</b>	<b>ready to do alpha/beta Testing and basic testcases to test the new features</b>
<b>V</b>	<b>Validation for turbomachinery applications</b>

# Examples of potential joint activities

	Hydro-Québec	Chalmers	Hydraulic turbine supplier
<b>PRE-PROCESSING</b>			
Mesh conversion (CGNStoFoam)	S	T	D
<b>SOLVER</b>			
MFR	D	D	
Rotor-stator interface	D	D	
General Grid Interface	D	D	
BC	S	S	S
	D	D	D

# Examples of potential joint activities

	Hydro-Québec	Chalmers	Hydraulic turbine supplier
<b>SOLVER</b>			
Cavitation		S	D
		D	
Fluid-structure interaction	V	D	
Free-surface	V		S
			D
<b>POST-PROCESSING</b>			
Paraview/VTK scripts	T		S
		D	D
Conversion (foamToCGNS)	S	T	

# Examples of potential joint activities

	Hydro-Québec	Chalmers	Hydraulic turbine supplier
<b>QUALITY</b>			
<b>Testcases</b>			
Turbine-99 draft tube	V	V	
ERCOFTAC conical diffuser	V	V	
U-bend			V
Free-surface	V		V
Water column			V
<b>Documentation</b>		D	
Turbo tutorials		D	
<b>Comparison with CFX</b>	V		V

# Examples of potential joint activities

	Hydro-Québec	Chalmers	Hydraulic turbine supplier
<b>COMPUTING ASPECT</b>			
Parallel performance	D	T	S
			D
Installation procedure	S	T	S
	D		D
Version control system	S	T	
	D		
Live CD/DVD	D	T	

# *Focus for the near future*

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- **We need to focus on specific projects with deadlines**
  - **Example:**
    - **Between HQ and Chalmers:**
      - **Automatic benchmarking for hydraulic turbines applications on large clusters**
      - **Development and testing related to GGI (with Hrvoje Jasak)**
      - **Validation testcase:**
        - ◆ **ERCOFTAC conical diffuser**
    - **Between HQ and VA TECH:**
      - **Validation testcase:**
        - ◆ **free-surface flows**

## *Focus for the near future*

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- **Distribution of relevant material**
  - **Contribute to OpenFOAM wiki:**
    - Links to publications, reports
    - Validation reports
    - Tutorials
    - Best Practice Guidelines
  
  - **Contribute to OpenFOAM public access development repository**

## *Official kick-off*

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**The OpenFOAM turbomachinery Working Group  
is officially started !**

**Be part of it: contact us at:**

**[hakan.nilsson@chalmers.se](mailto:hakan.nilsson@chalmers.se)**

**[page.maryse@ireq.ca](mailto:page.maryse@ireq.ca)**

**or meet us tonight ...**

**Be ready to live the OpenSource experience with  
OpenFOAM !**

## *Next meeting*

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- **next OpenFOAM Workshop ?**
- **next OpenFOAM Training ?**
- **organize an extra day for Turbo WG ?**