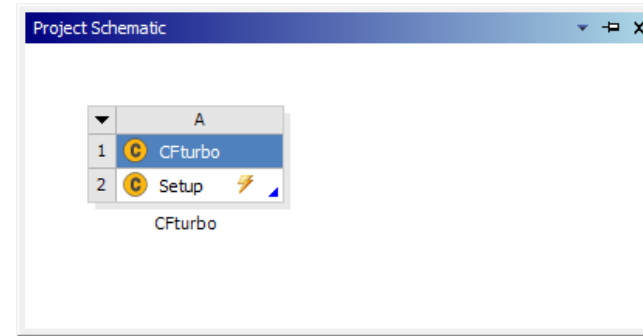


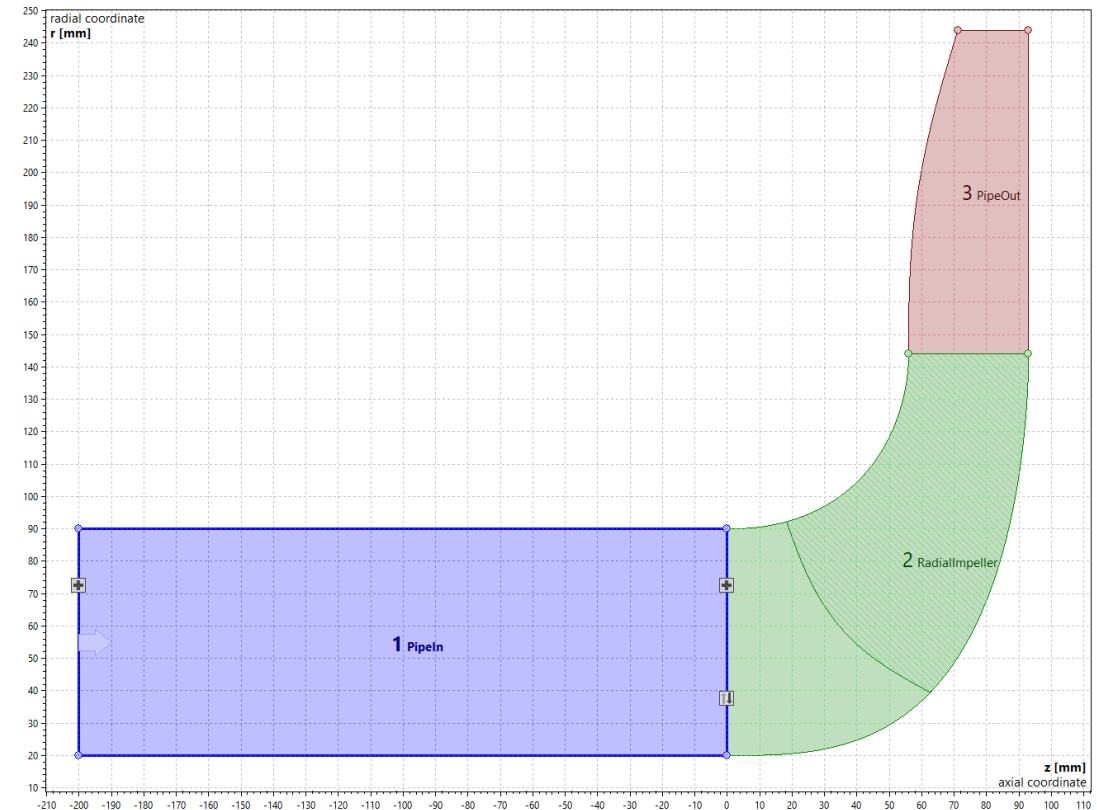
CFturbo

Design Exploration with CFturbo
inside Ansys Workbench

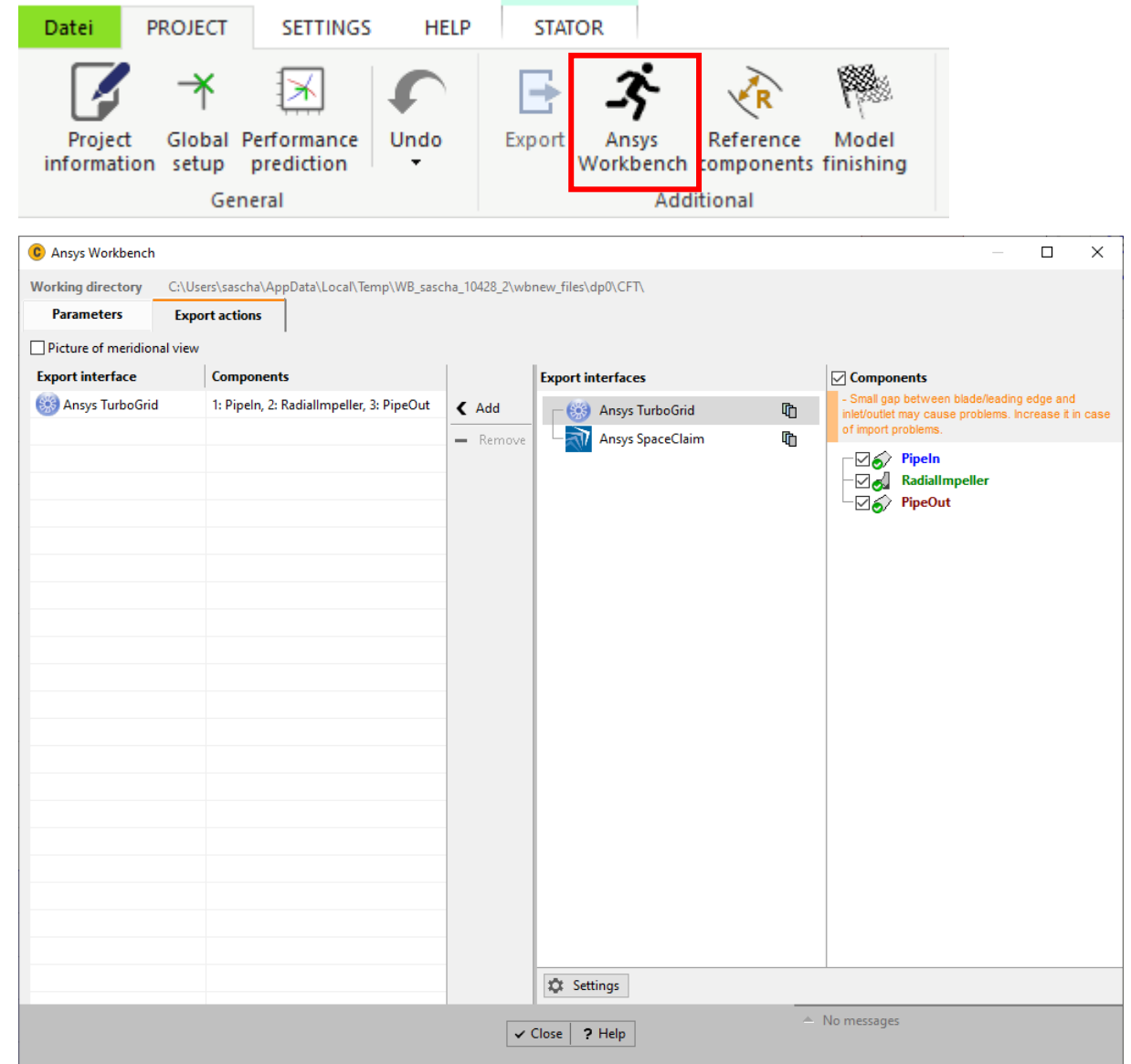
- Create a new ANSYS Workbench project with an empty CFturbo system.



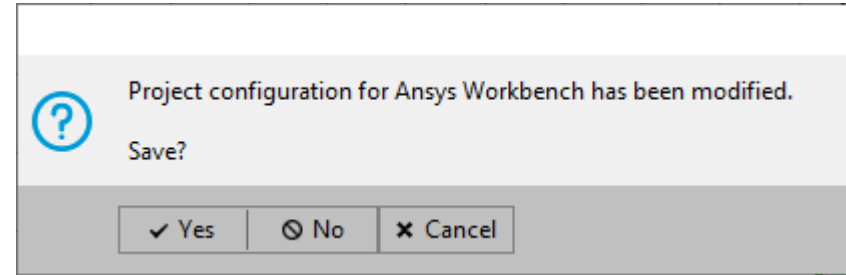
- Open the Setup cell in the CFturbo system and import your initial design or create it in CFturbo.



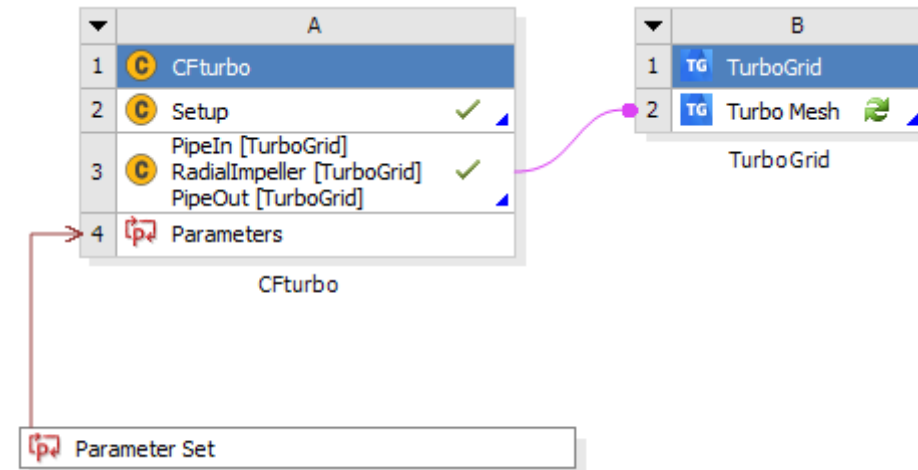
- Open the ANSYS Workbench dialog in CFturbo.
- Choose the parameters to vary and create the export actions for TurboGrid.
- In this example the trailing edge circumferential angle is a parameter. Since the leading edge circumferential angle is constant, the blade wrap angle of the impeller is controlled.



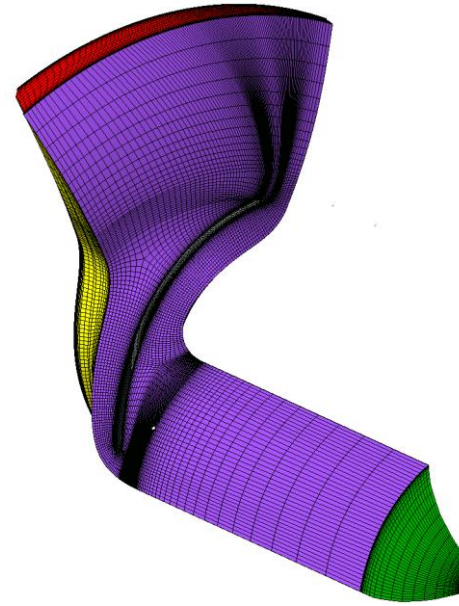
- Exit CFturbo and confirm the save dialog.



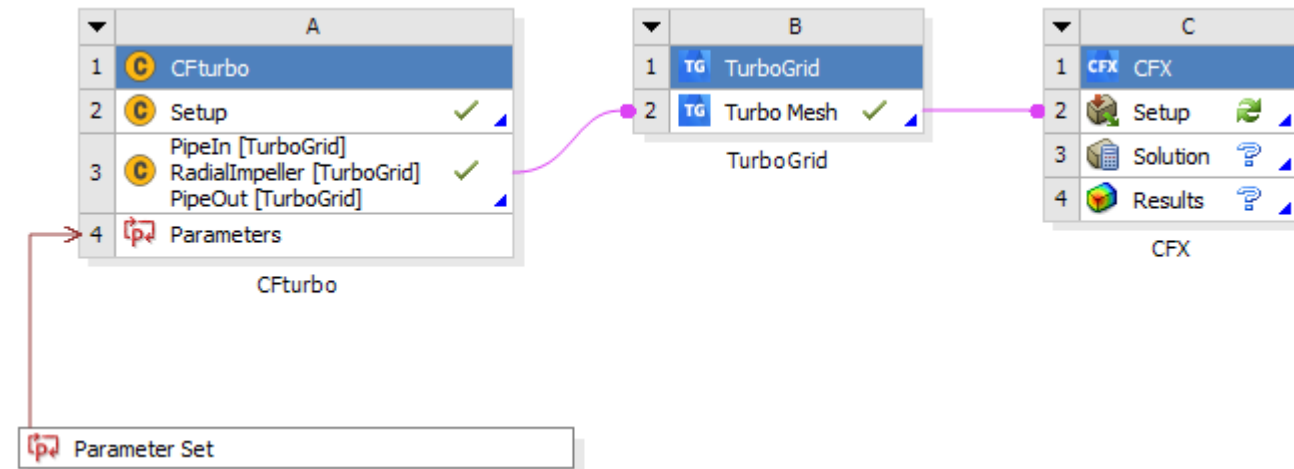
- Update the CFturbo system in ANSYS Workbench in order to create the exports. Then drag and drop the TurboGrid system on the CFturbo export.



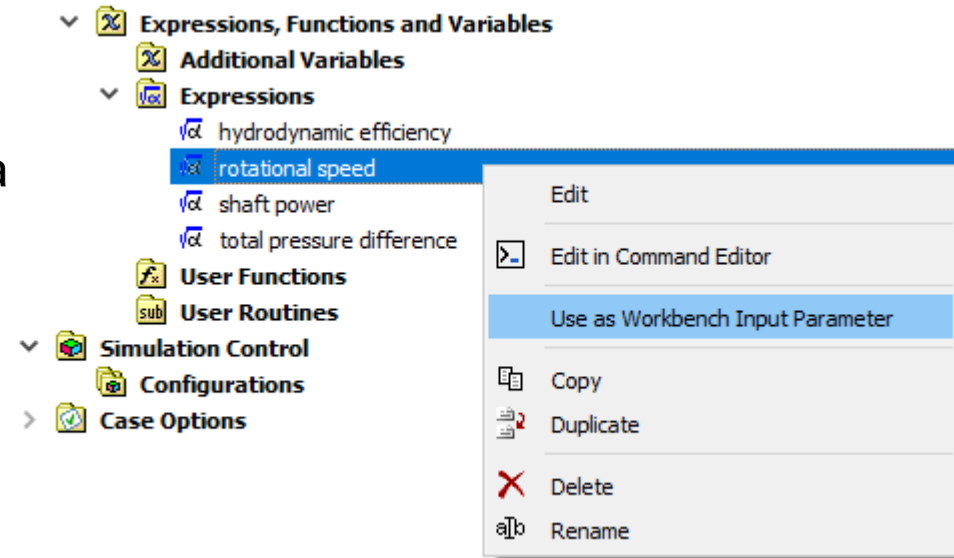
- Create a mesh in TurboGrid that fits your demands.



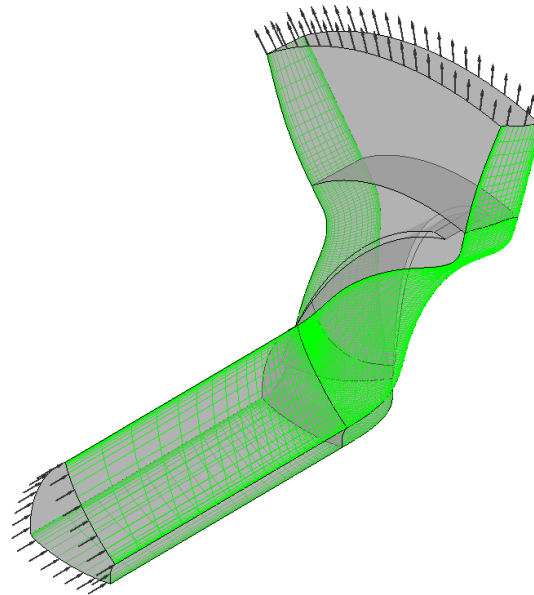
- Exit TurboGrid, then drag and drop a CFX system on the Turbo Mesh cell.



- If necessary, define additional input parameters via expressions in CFX-Pre expressions.

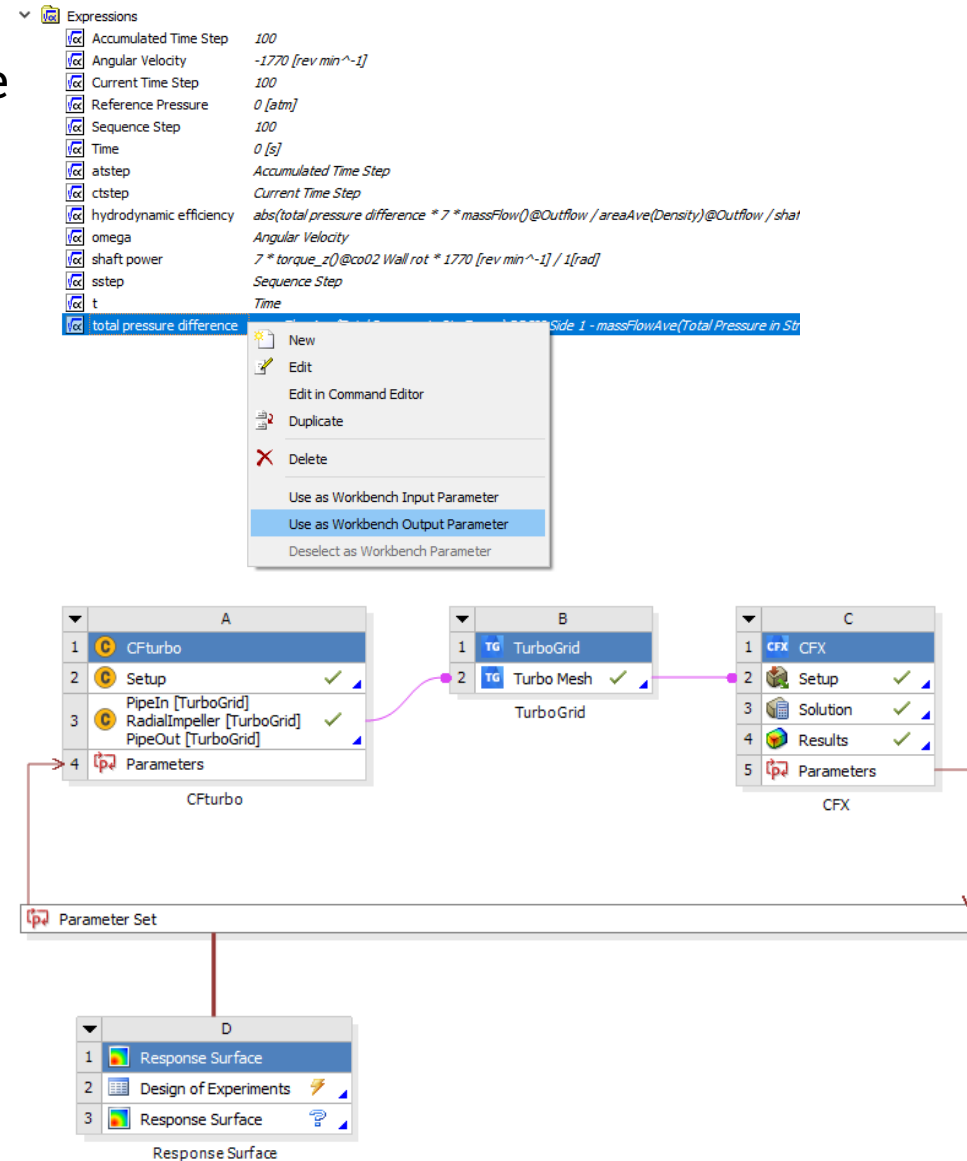


- Complete the CFD pre-processing.



- Do a test run, then open the results container in the CFX system and define your output parameters via the CFD-Post expression tab.
- Exit CFD-Post.

- Select the Design Exploration system of your choice and attach it to the parameter set via drag and drop.



- Configure the DOE (Design of Experiments)
 - Configure the option for data preservation under Design of Experiments (disabled by default).
 - Configure your sampling type under Design of Experiments.

- Enable/Disable the parameters that should be used for the DOE.

- Set the upper and lower bounds for the enabled parameters.

Proprietes of Outline : Design of Experiments

	A	B
1	Property	Value
2	Design Points	
3	Preserve Design Points After DX Run	<input checked="" type="checkbox"/>
4	Retain Data for Each Preserved Design Point	<input checked="" type="checkbox"/>
5	Failed Design Points Management	
6	Number of Retries	0
7	Design of Experiments	
8	Design of Experiments Type	Central Composite Design
9	Design Type	Auto Defined
10	Design Point Report	
11	Report Image	None

Outline of Schematic D2: Design of Experiments

	A	B
1		Enabled
2	Design of Experiments	
3	Input Parameters	
4	Cfturbo (A1)	
5	P6 - RadialImpeller.Mean surface0.0.tePos.Trailing edge position	<input checked="" type="checkbox"/>
6	Output Parameters	
7	CFX CFX (C1)	
8	P3 - total pressure difference	
9	P4 - hydrodynamic efficiency	
10	P5 - shaft power	
11	Cfturbo (A1)	
12	P7 - RadialImpeller.Mean surface0.5.tePos.Trailing edge position	
13	Charts	
14	Parameters Parallel	
15	Design Points vs Parameter	

Proprietes of Outline A5: P6 - RadialImpeller.Mean surface0.0.tePos.Trailing edge posi

	A	B
1	Property	Value
2	General	
3	Units	degree
4	Type	Design Variable
5	Classification	Continuous
6	Values	
7	Lower Bound	70
8	Upper Bound	110
9	Allowed Values	Any

- Preview the defined samples by right clicking the Design of Experiments container and choosing Preview...

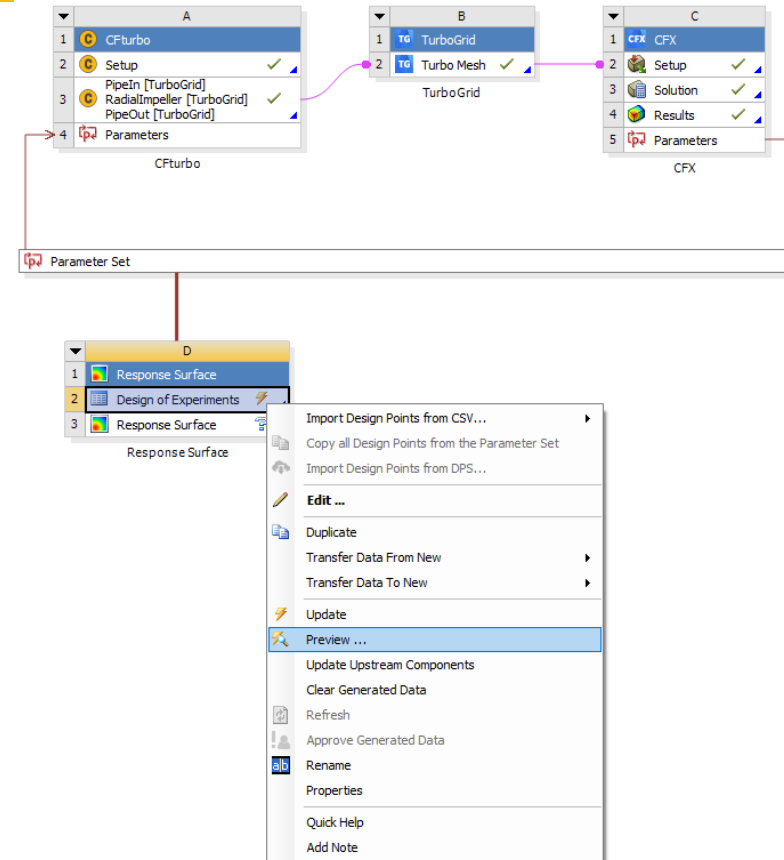


Table of Outline A2: Design Points of Design of Experiments

	A	B	C	D	E	F	G
1	Name	Update Order	P6 - RadialImpeller.Mean surface0.0.te...	P3 - total pressure difference (Pa)	P4 - hydrodynamic efficiency	P5 - shaft power (W)	P7 - RadialImpeller.Mean surface0.5.te...
2	2	1	70	⚡	⚡	⚡	⚡
3	4	2	80	⚡	⚡	⚡	⚡
4	1	3	90	⚡	⚡	⚡	⚡
5	5	4	100	⚡	⚡	⚡	⚡
6	3	5	110	⚡	⚡	⚡	⚡

- Start the DOE by right clicking the Design of Experiments container and choosing Update.
- After the DOE has finished, charts will be created automatically.
- Additionally, you can create response surfaces by updating the Response Surface container in the project schematic.
- Line plots of the active (enabled) input parameters and the output parameters can be also be configured.

Progress			
	A	B	C
1	Status	Details	Progress
2	Updating the Design of Experiments component in Response Surface Optimization	Updating the Turbo Mesh component in TurboGrid for Design Point 1	<div style="width: 100%; height: 15px; background-color: green;"></div>

Outline of Schematic D2: Design of Experiments		
	A	B
1		Enabled
2	Design of Experiments	
3	Input Parameters	
4	CFturbo (A1)	
5	P6 - RadialImpeller.Mean surface0.0.tePos.Trailing edge position	<input checked="" type="checkbox"/>
6	Output Parameters	
7	CFX (C1)	
8	P3 - total pressure difference	
9	P4 - hydrodynamic efficiency	
10	P5 - shaft power	
11	CFturbo (A1)	
12	P7 - RadialImpeller.Mean surface0.5.tePos.Trailing edge position	
13	Charts	
14	Parameters Parallel	
15	Design Points vs Parameter	

