



WBC Virtual Manufacturing Network – Fostering an Integration of the Knowledge Triangle

University - enterprise cooperations



European Commission
TEMPUS

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Kragujevac, 25.03.2009.



Faculty of Engineering - enterprise cooperations

- A great part of activities at the Faculty is conducted through the cooperation with the economy and other institutions in surroundings. Some of examples will be presented here.
- Collaboration activities include various types of expert education, collaborating projects for the industry and other institutions.
- Students do their practice in the industry while employers from there come to attend seminars, workshops and to participate in whole-life education programmes or to enrol in the postgraduate professional and scientific study programme.
- In scope of collaboration with the industry, the Faculty annually organizes the meeting-days called „Days of Open Faculty's Doors“, when direct contacts between the people from the economy, the students and teachers take place. Such events give the opportunity for both-side to introduce each other with actual topics, like: new production programmes, new technologies, employment, scholarships, student practice, education programmes etc.
- The most important Faculty's partners from this field are:
INA, HEP, Shipyard „3. MAJ“, Shipyard „Uljanik“, Shipyard „Viktor Lenac“, Shipyard „Kraljevica“, SAIPEM, Hrvatske vode - Croatian Waters, IGH, CIMOS, DINA, STSI, ENERGO, ELCON GERÄTEBAU and others.
- Overview of the Faculty projects for industry
<http://www.riteh.hr/economy/projects.html>

Project title: SIX SIGMA CONTINUOUS IMPROVEMENTS IN DIE-CASTING PROCESSES

Partner: PS CIMOS – PCC d.o.o., Buzet, Croatia

Objective: To reduce scrap level in die-casting process

Results:

	Scrap due mould spraying	Cold shut
Scrap level at the beginning of project	1,92 %	5,75 %
Scrap level at the end of project	0,55 %	2,89 %
Improvement	1,37 %	2,86 %

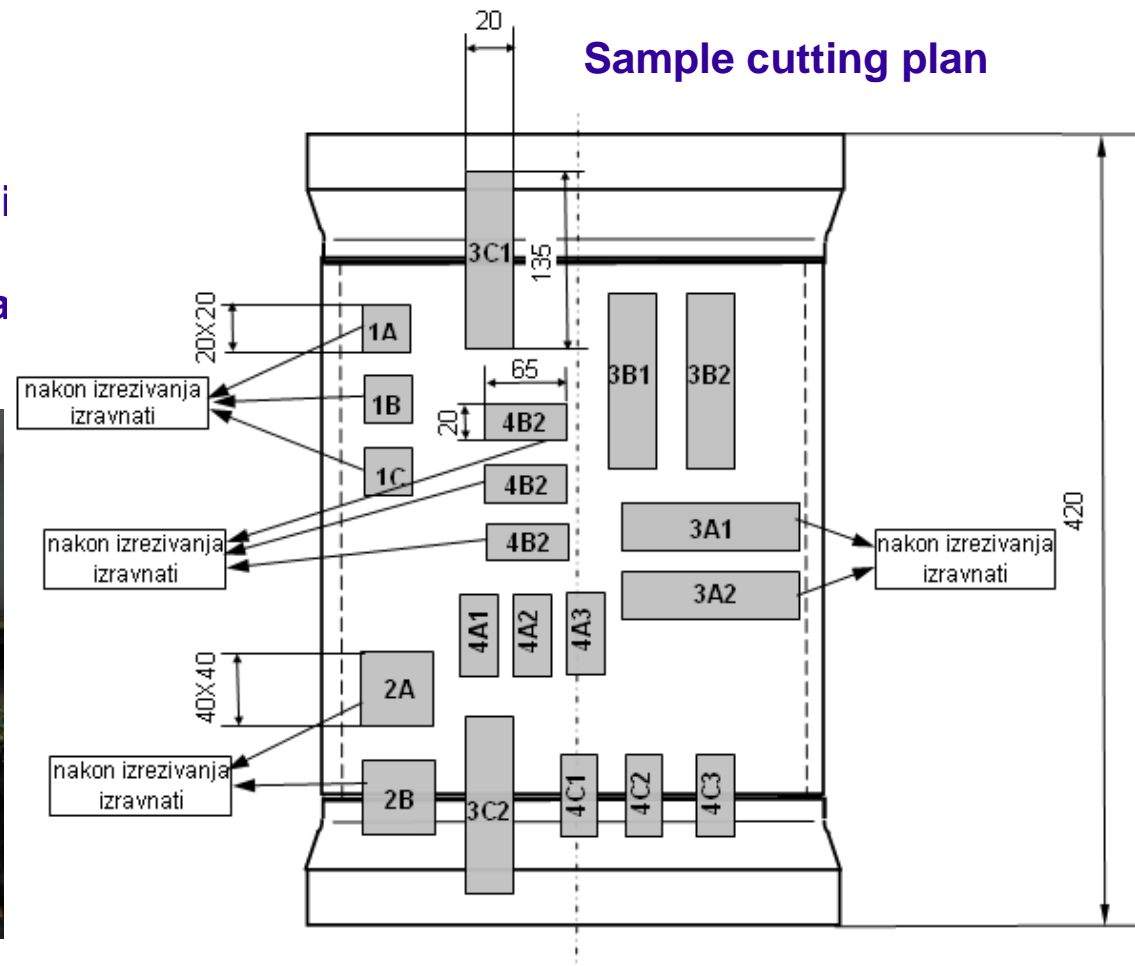


Project title: INSPECTION OF PIPELINE SEGMENT OF 303 PLATFORMING 1 FACILITY OF OIL REFINERY RIJEKA

Partner: STSI d.o.o., Zagreb, Croatia

Objective:

- chemical analysis,
- metallographic analysis
- mechanical testing
- determination of deca quality



Results:

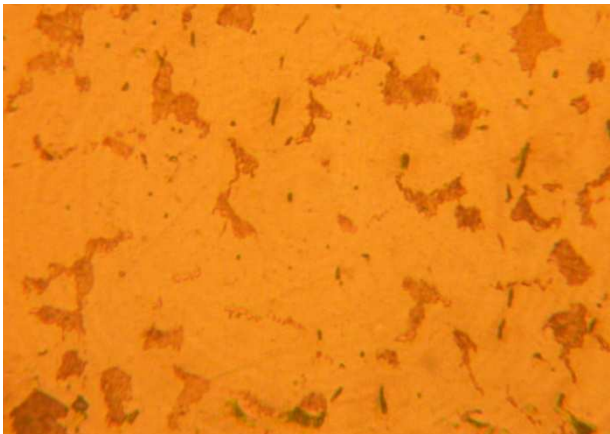
Chemical analysis

Chemical analysis of sample 1A

Chemical composition	C	Mn	P	S	Cu*	Ni*	Cr*	Mo*	V*
Declared max, %	0.25	0.95	0.05	0.045	0.40	0.40	0.40	0.15	0.08
Analysis result, %	0.10	0.51	0.02	0.030	0.12	0.08	0.11	0.03	0.00

* %Cu + %Ni + %Cr + %Mo + %V ≤ 1 %

Metallographic analysis

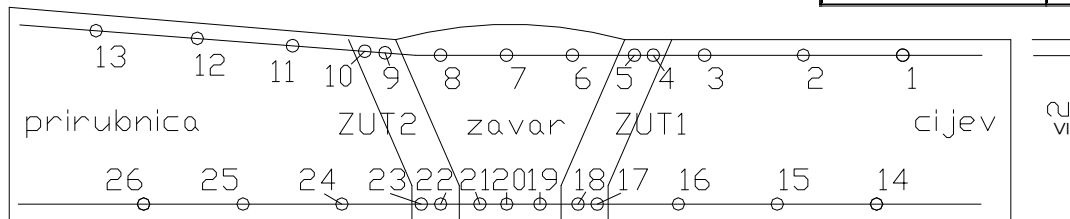


Microanalysis of sample 1A
Ferrite and pearlite, 2% HNO₃, 500:1

Mechanical testing

Microhardness testing of sample 2B

Position		Hardness HV10	
Outside	pipe ASTMA 53 Gr. A	1	123
		2	125
		3	127
	HAZ1	4	144
		5	155
	weld	6	167
		7	174
		8	176
	HAZ2	9	174
		10	178
	flange ASTMA 105 Gr. I	11	139
		12	142
		13	133
14		122	
15		127	
16		127	
Inside	pipe ASTMA 53 Gr. A	17	138
		18	151
	weld	19	169
		20	166
		21	175
	HAZ2	22	190
		23	179
	flange ASTMA 105 Gr. I	24	149
		25	147
		26	142



Mechanical testing

Tension tensile test results of sample 3A1

	Yield strength		Ultimate tensile strength		Elongation		Contraction
	F_e kN	R_e N/mm ²	F_m kN	R_m N/mm ²	Elongation at 50.8 mm %	$A_{5,65}$ %	Z %
Declared ASTM A 53 Gr. A	/	205	/	330	24	25	/
Analysis result	16.7	332	21.5	428	28	36	70

Charpy "V" impact tests results

Sample (ISO-V)	KV, J
4A1	120
4A2	192
4A3	202
4B1	83
4B2	82
4B3	83
4C1	152
4C2	103
4C3	62

Department's industrial partners:

- *STSI d.o.o.*
- *Oil Refinery Rijeka d.d.*
- *NAVI-MARIN d.o.o.*
- *ZAVAR d.o.o., etc.*

DEPARTMENT OF ENGINEERING MECHANICS

Project title: STRAIN GAGE MEASUREMENTS AND NUMERICAL ANALYSIS AT A SHIP ENGINE

Partner: Shipyard "3. Maj", Rijeka, Croatia

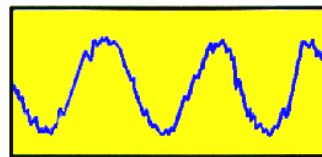
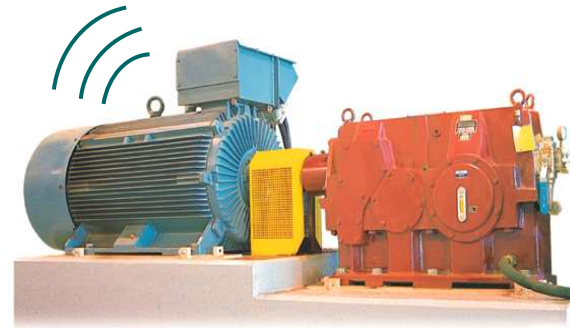
Objective: Strain measurement at bearings (verification of technical characteristics)



Project number: 144684-TEMPUS-2008-RS-JPHES

Project title: MECHANICAL VIBRATION

Objective: Evaluation of machine vibration by measurements on nonrotating parts (ISO 10816) (verification of technical characteristics)



10-1000 Hz

mm/s RMS

Limits	Class II	Class III	Class IV	Class V	mm/s RMS
28	Red	Red	Red	Red	20
18	Red	Red	Red	Yellow	10
11	Red	Yellow	Yellow	Green	5
7,1	Yellow	Green	Green	Green	2
4,5	Yellow	Green	Green	Green	1
2,8	Green	Green	Green	Green	
1,8	Green	Green	Green	Green	
1,1	Green	Green	Green	Green	

Department's industrial partners:

- *DINA - Petrokemija d.d.*
- *LUKA Rijeka d.d.*
- *INA industrija nafte d.d., etc.*

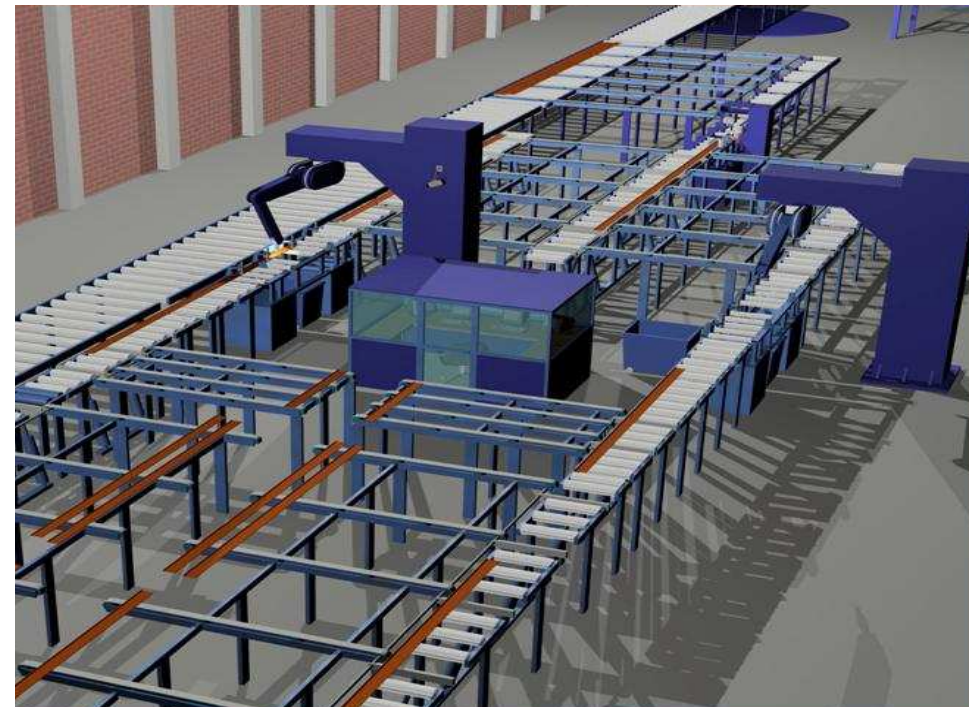
Project number: 144684-TEMPUS-2008-RS-JPHES

Partner: Shipyard "3. Maj", Rijeka, Croatia

Objective: Process modeling for throughput improvement

Project titles:

- 1. Analysis of Material Flow in the Prefabrication and Fabrication Phases of the Hull Elements, (2005)**
- 2. Profile Process Model, (2004)**
- 3. Pipe Process Model, (2002)**
- 4. Panel Fabrication Model, (2002)**

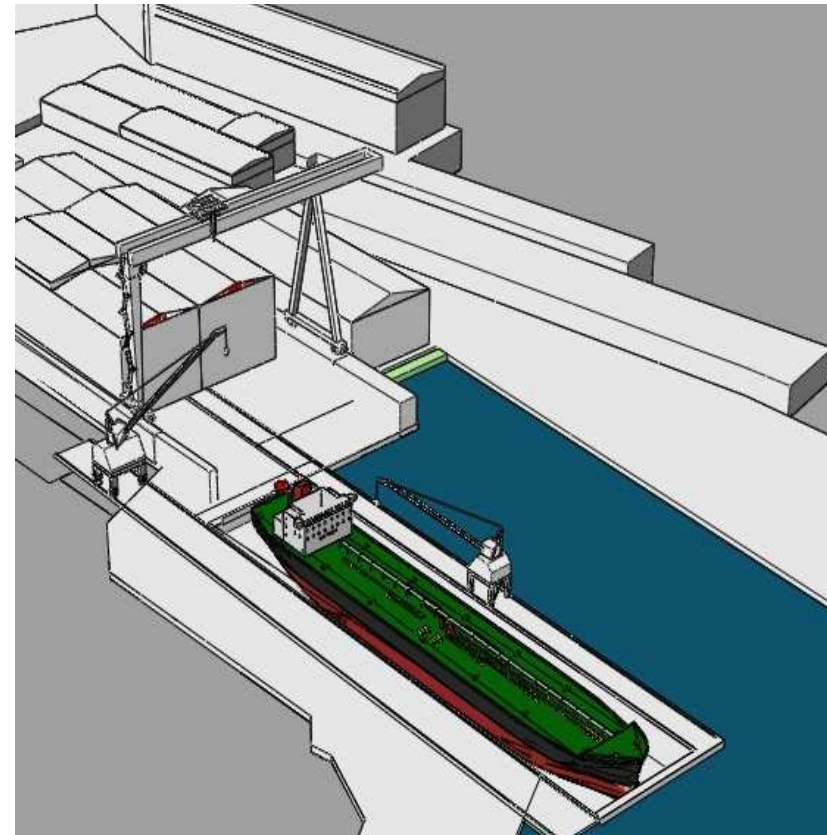


Partner: Shipyard “Kraljevica”, Kraljevica, Croatia

Objective: Shipyard design for performances improvement

Project titles:

- 1. Shipyard Technological Modernization Project, (2006)***
- 2. Technological Study of the Pipe Workshop, (2006)***
- 3. Slipway Reassignment to a Horizontal Plateau for Final Hull Assembly, (2008)***
- 4. Dry Dock and New Sub-Assembly Workshop Conceptual Design, (2008)***

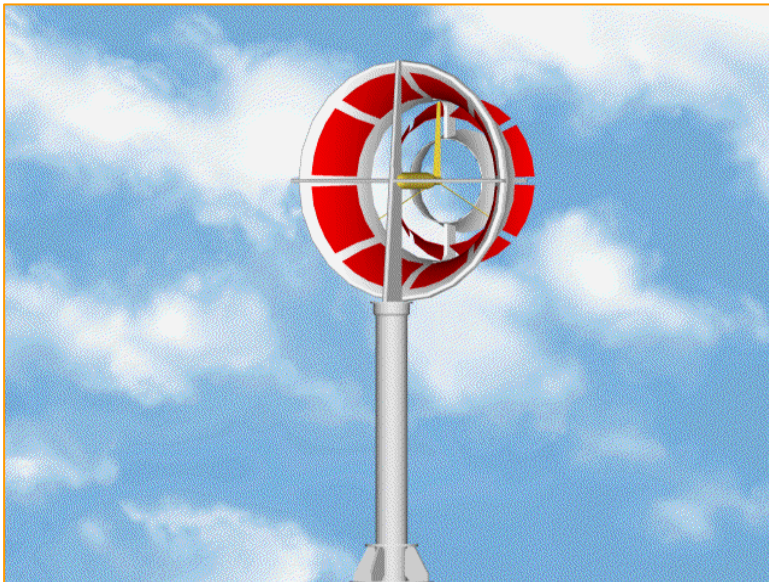


Project title: PROTOTYPE OF WIND TURBINE IN NOZZLE

Partner: *Bimont d.d., Kukuljanovo, Croatia (author of concept - Ivan Vrsalovic)*

Objective:

1. wind turbine prototype producing with nozzle optimization
2. verification of technical characteristics – measurement



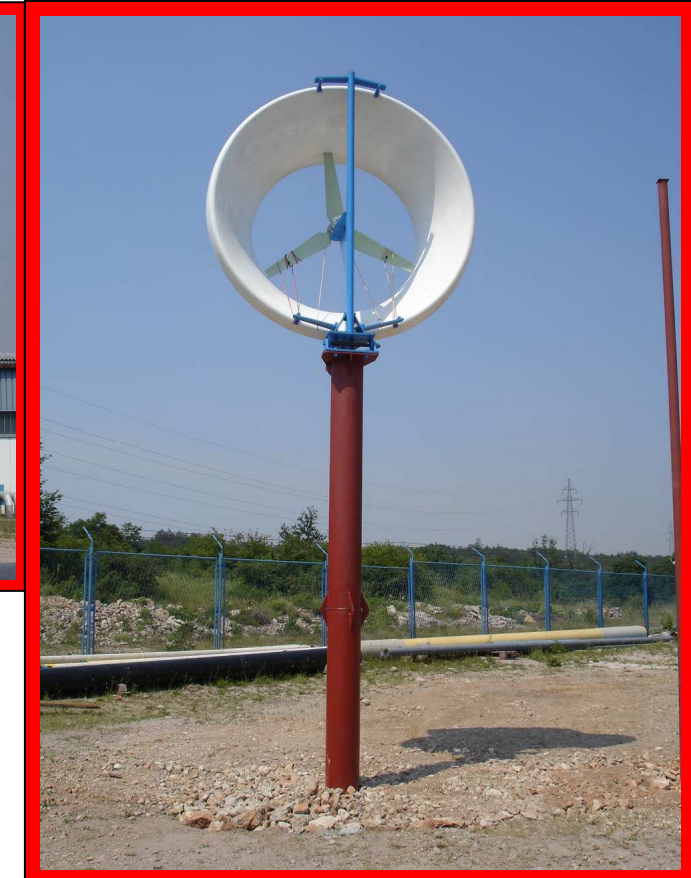
“3. MAJ d.d., Rijeka



MHI d.o.o., Rijeka

Objective:

1. wind turbine prototype producing with nozzle optimization

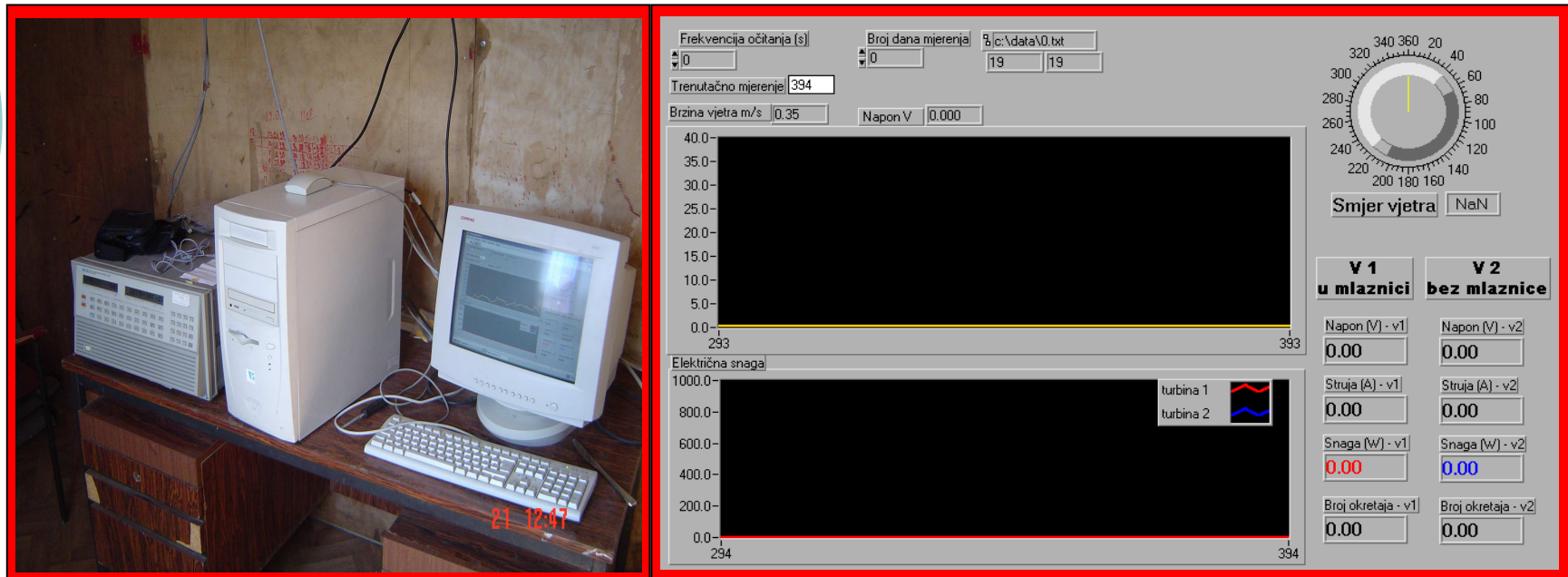


BIMONT d.d., Kukuljanovo

Project number: 144684-TEMPUS-2008-RS-JPHES

Objective:

2. verification of technical characteristics – measurement (ongoing)



Expected results:

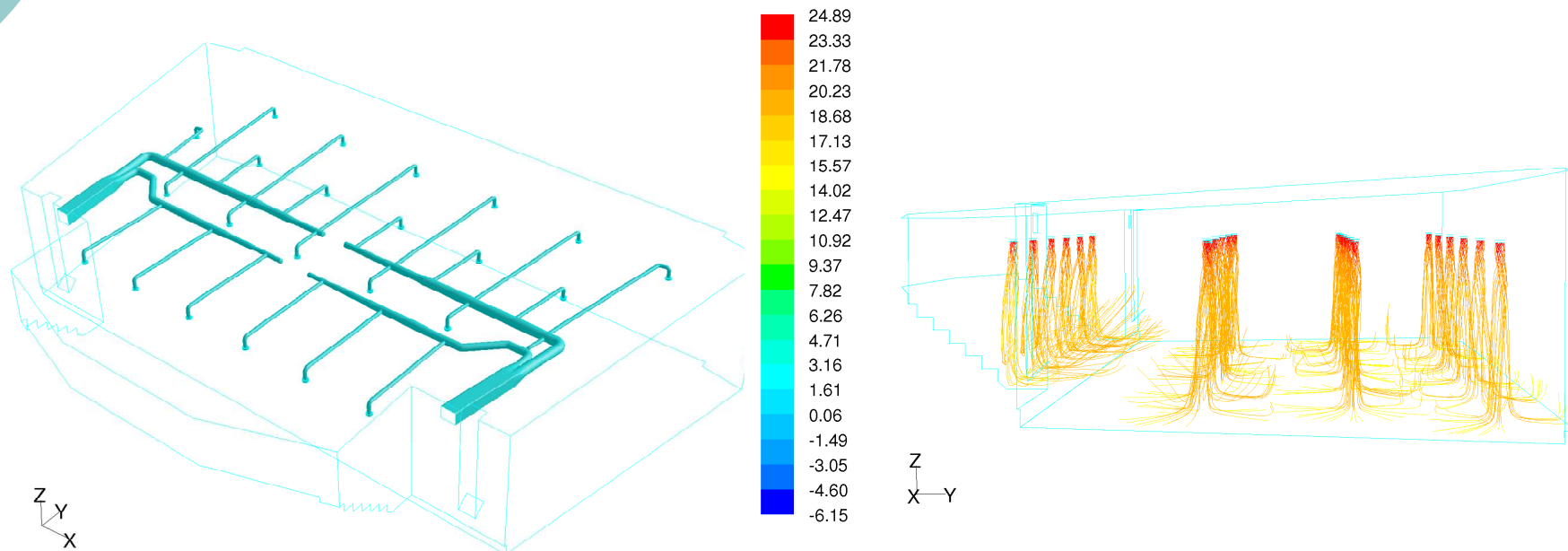
- energy efficiency 3-4 times in comparison with regular wind turbine without nozzle,
- efficiently velocity control in optimal range, useful at weak wind.

Project title: ENERGY STUDY AND ANALYSIS OF OPTIMAL SOLUTION FOR AIR CONDITIONING OF SPORTS FACILITIES

Partner: City of Rijeka, Croatia

Objective:

- analysis of optimal solution for air conditioning,
- optimization of heat distribution systems,
- using heat pump with seawater as heat source.

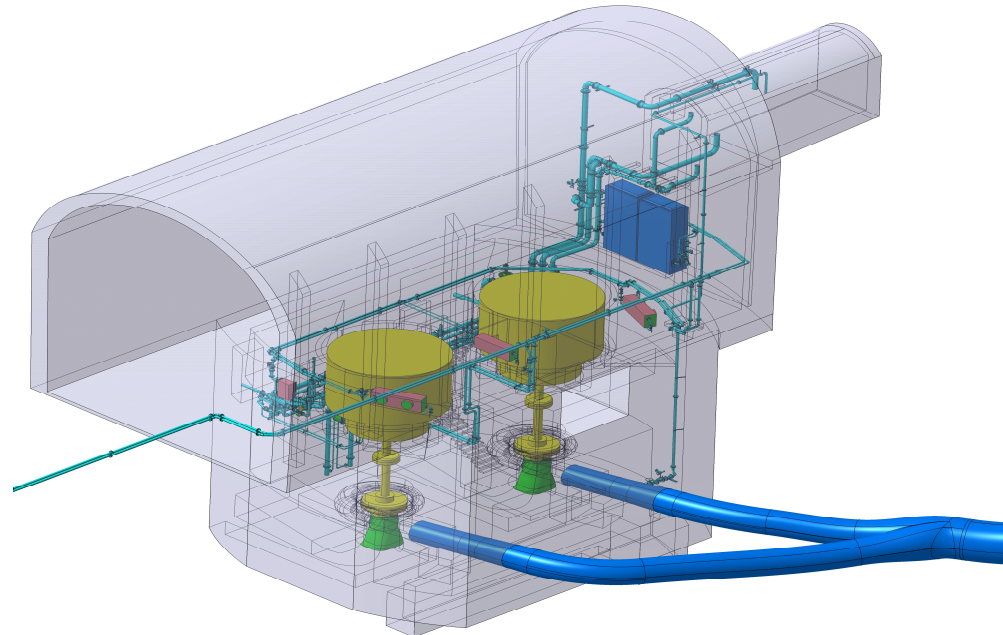


Project title: COOLING PIPE AND AIR CONDITIONING SYSTEMS IN HYDROELECTRIC POWER PLANT

Partner: HEP – PP HE Zapad d.d, Rijeka, Croatia

Objective:

- energy efficiency solution with combination of self-cooling and process cooling.



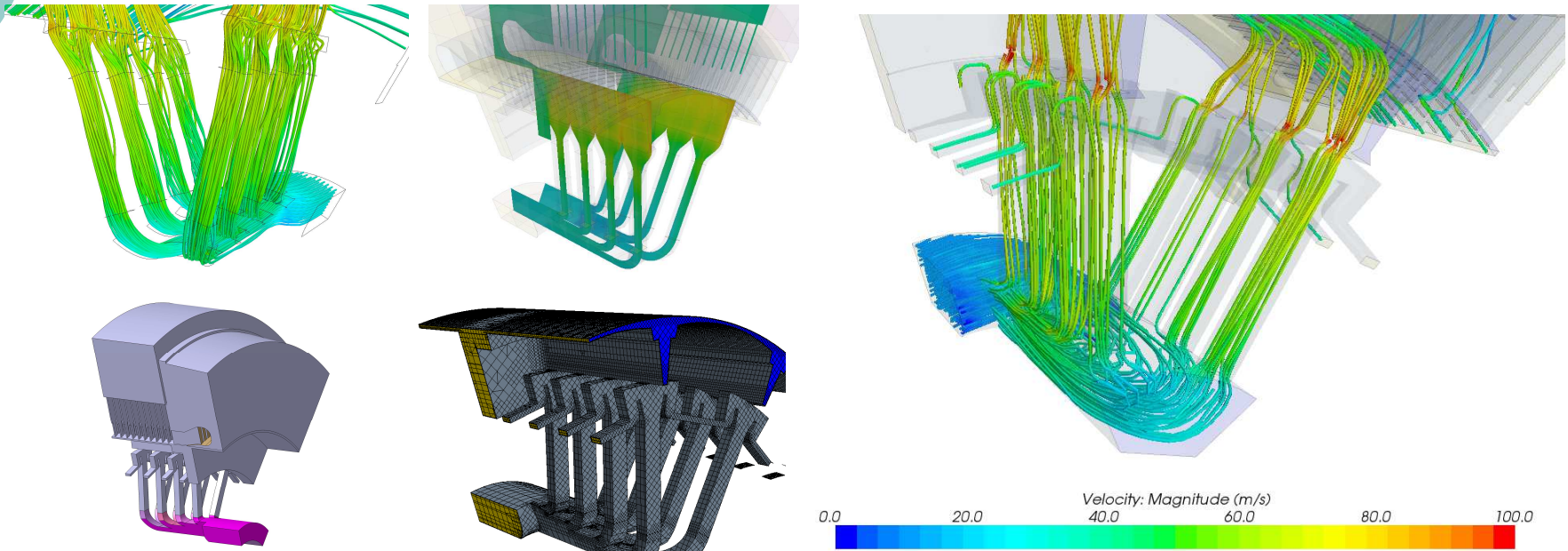
DEPARTMENT OF THERMODYNAMICS AND ENERGY ENGINEERING &
DEPARTMENT OF FLUID MECHANICS AND COMPUTATIONAL ENGINEERING

Project title: OPTIMIZATION GEOMETRY OF HYDRO GENERATOR

Partner: HEP – PP HE Zapad d.d, Rijeka, Croatia

Objective:

- achieve of minimal flow losses by optimal geometry of hydro generator





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**THANK YOU
FOR YOUR ATTENTION
AND PATIENCE**