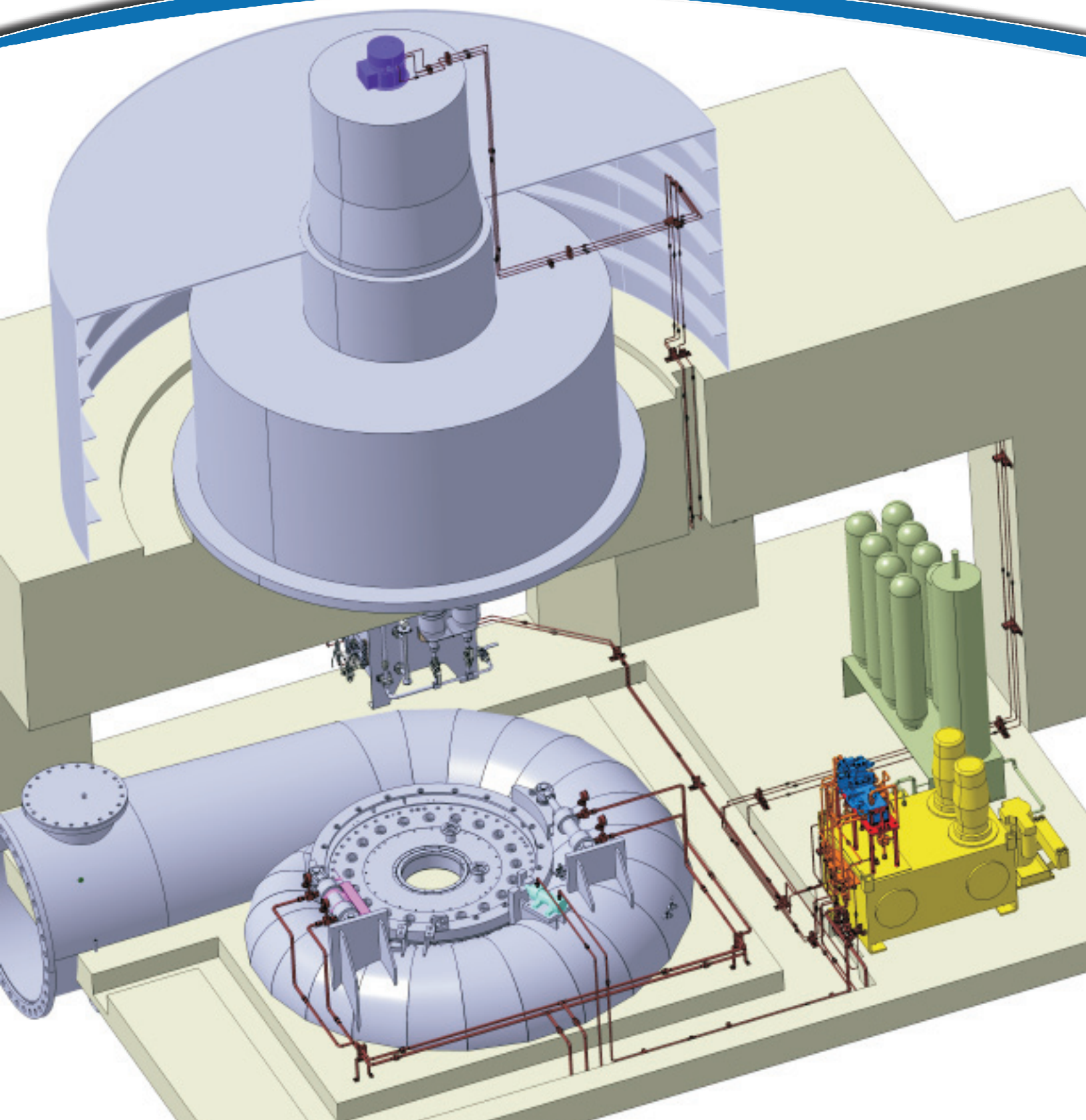


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DIGITAL SPEED GOVERNORS & OIL PRESSURE UNITS

UCM Resita is certified according to ISO 9001: 2008 & 14001: 2004

DIGITAL SPEED GOVERNORS & OIL PRESSURE UNITS

Hydro Engineering (UCM Resita's R&D division, operating as an independent company) designs, manufactures and performs the mounting and commissioning of speed governors and pressure oil units related to the Kaplan, Francis, Bulb turbines for any power. This activity has a tradition of 60 years and during this period more than 300 speed governors of different types (mechanic-hydraulic, electro-hydraulic and digital electro-hydraulic) have been manufactured.

Today, **Hydro Engineering** designs, manufactures and performs the installing and commissioning of digital speed governors and pressure oil units having the following structure:

> Hydromechanical part equipped with:

- Hydraulic control block with HRV servo solenoid valves with OBE (Moog, Parker and Rexroth) NG 16;NG 25;NG32. and emergency valve
- Oil pressure unit with nitrogen bottle equipped with electro pumps, pipes and fittings, safety valve, relief valve and devices
- Transducers for all equipments

> Digital command equipment including:

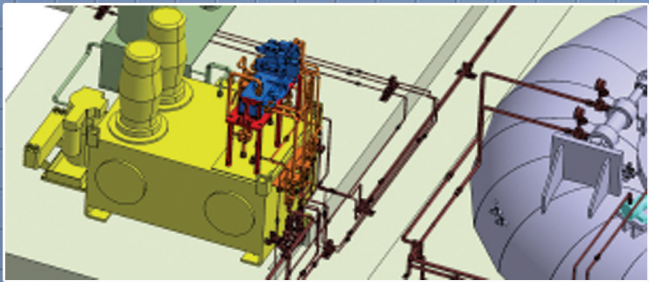
- power supply
- PLC R3xi(GE Fanuc) 300 MHz, Quantum (Schneider), 166 MHz
- high speed counter: 80-150 kHz
- analog inputs & outputs: 16 channels, 12 bit
- digital inputs & outputs : 32 channels, 24 Vdc
- data panel : touch screen 6-7 inch, 256 colors
- communications: Ethernet, CAN, Modbus /RTU, Modbus plus, RS 232, RS 485
- GPS: hour and date updating

> Speed governor parameters:

- A/D conversion time:<0.1 ms
- permanent speed droop:1-10 %
- time constant: Td= 0-99 sec
- frequency set point: 47.5-52.4 Hz
- frequency dead band: 0.05 Hz
- frequency accuracy: <5 mHz
- digital cam
- governor insensibility: <10mHz
- power supply 220 Vdc
- over voltage protection, by-pass protections
- checksum, watchdog
- input signal: 0-10 Vdc; 4-40 mA
- auto-adaptive transfer functions

> Digital speed governor HEPP implementation

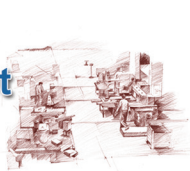
- installing and starting within HEPP
- performance test (IEC 60308)
- real time data acquisition equipment (LabVIEW software Vis)



Extract from reference list

Plant	Owner	Units	Turbine type	Power [KW]	Speed [rpm]	Size of main distributing valve	Nominal pressure [mm]
Rastolita	Hidroelectrica Romania	2	FRANCIS	25 000	500	ND 25	40
Maragua	Farab - Iran	2	FRANCIS	6 070	500	ND 16	180
Merila	Farab - Iran	2	FRANCIS	9 100	333.33	ND 16	180
Şugag	Hidroelectrica Romania	2	FRANCIS	80 000	428	ND 32	40
Turnu	Hidroelectrica Romania	2	FRANCIS	36 000	115.4	ND 32	40
Slatina	Hidroelectrica Romania	1	FRANCIS	14 000	107	ND 100	40

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