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DuoTurbo : First Product and Pilot Test Sites

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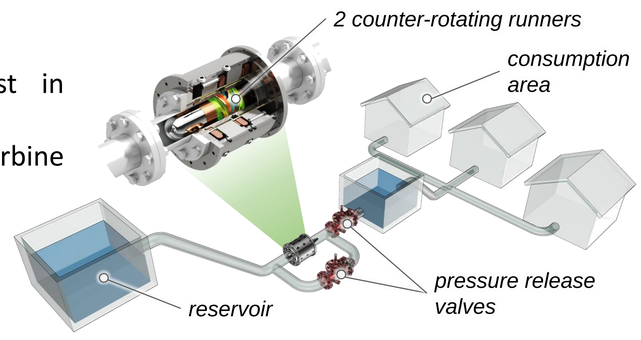
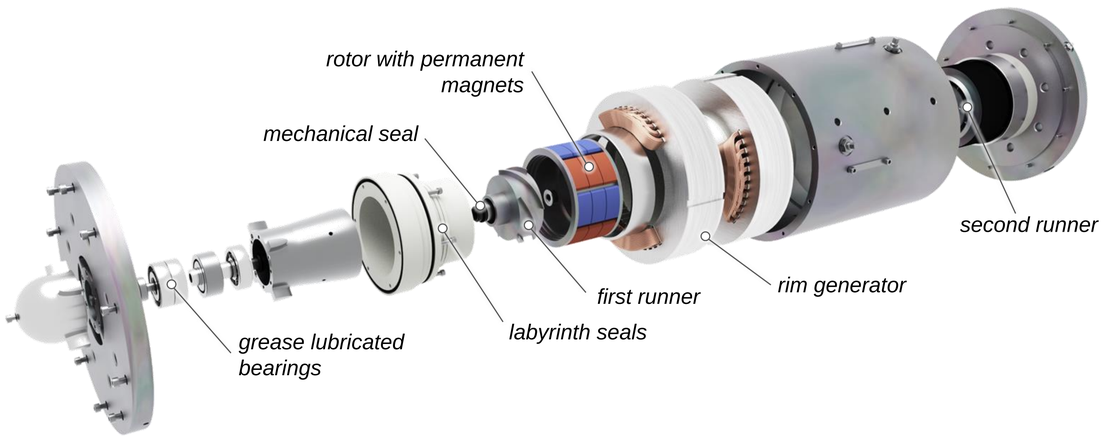
Context

- Recovering hydraulic energy lost in **drinking water networks**
- Modular in-line "plug and play" turbine from **5 to 25 kW**
- No environmental impact
- Low investment costs



Mechanical concept

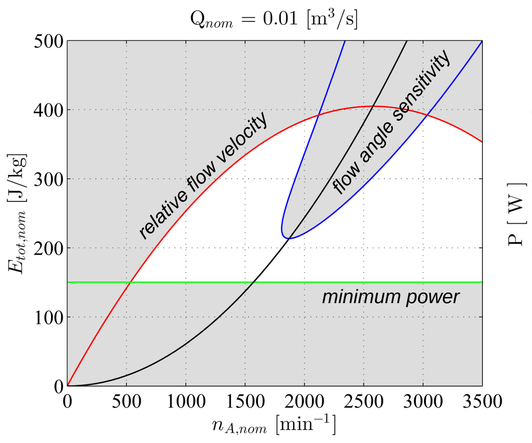
Based on the experience gathered during the prototype phase, a new mechanical concept was established. The achieved mechanical robustness enables the possibility of long term operation at the pilot sites. The mechanical complexity was significantly reduced and a modularity to target a wide discharge range is provided.

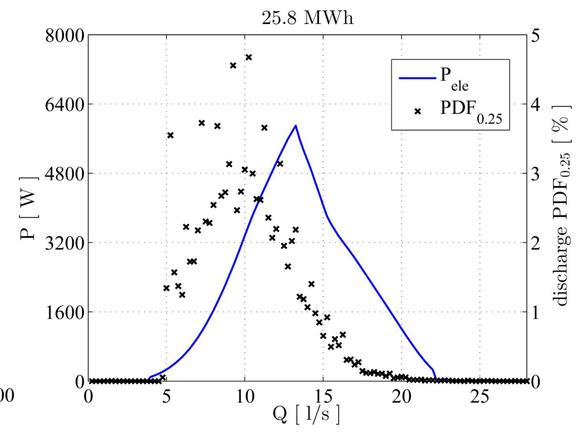


Hydraulic design

Hydraulic characteristics

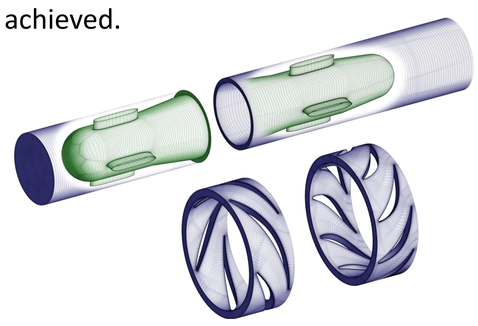
The runners of the first product were designed for the pilot site of Savièse. According to different design limitations, a reasonable design point was chosen.

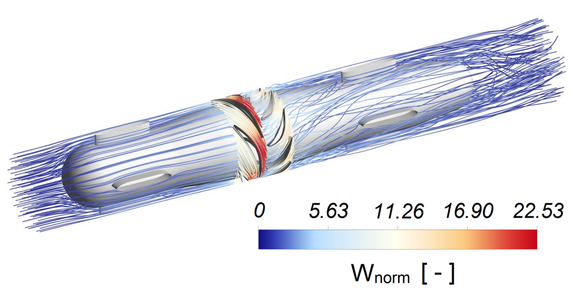


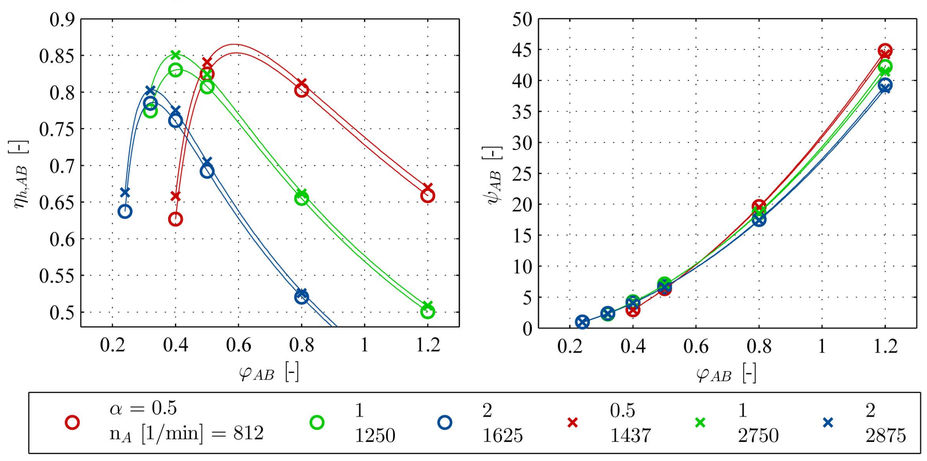


Numerical simulations

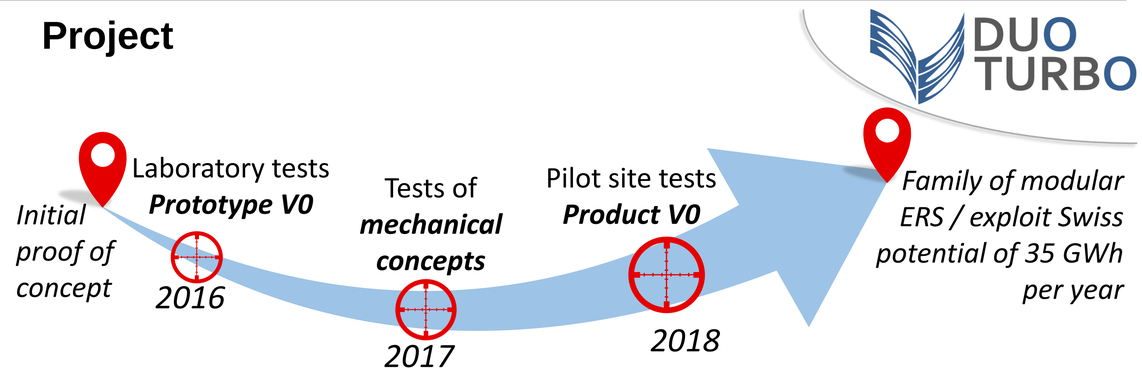
The runner design was iteratively established by means of CFD simulations in order to maximize the turbine's performance. A hydraulic efficiency of more than 85 % is achieved.





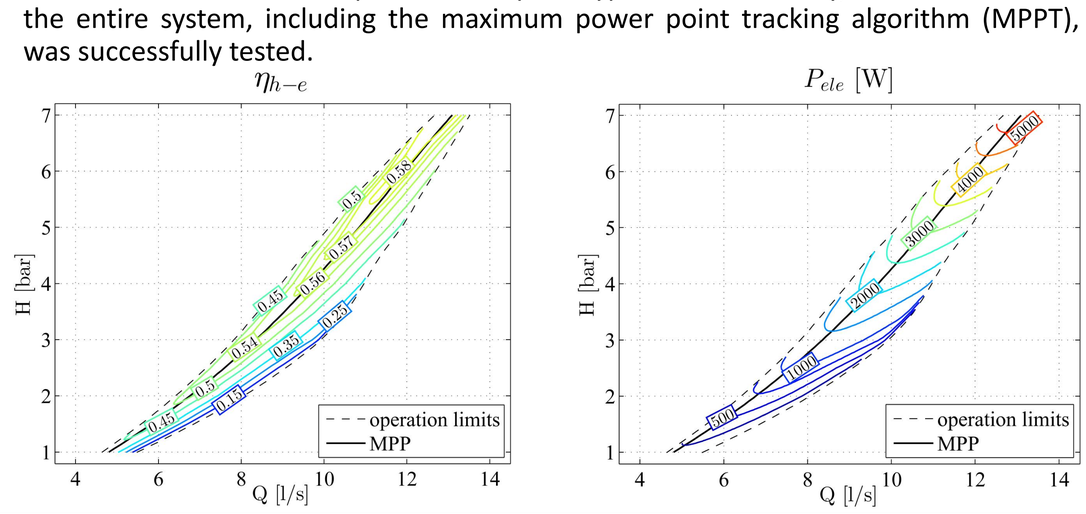


Project



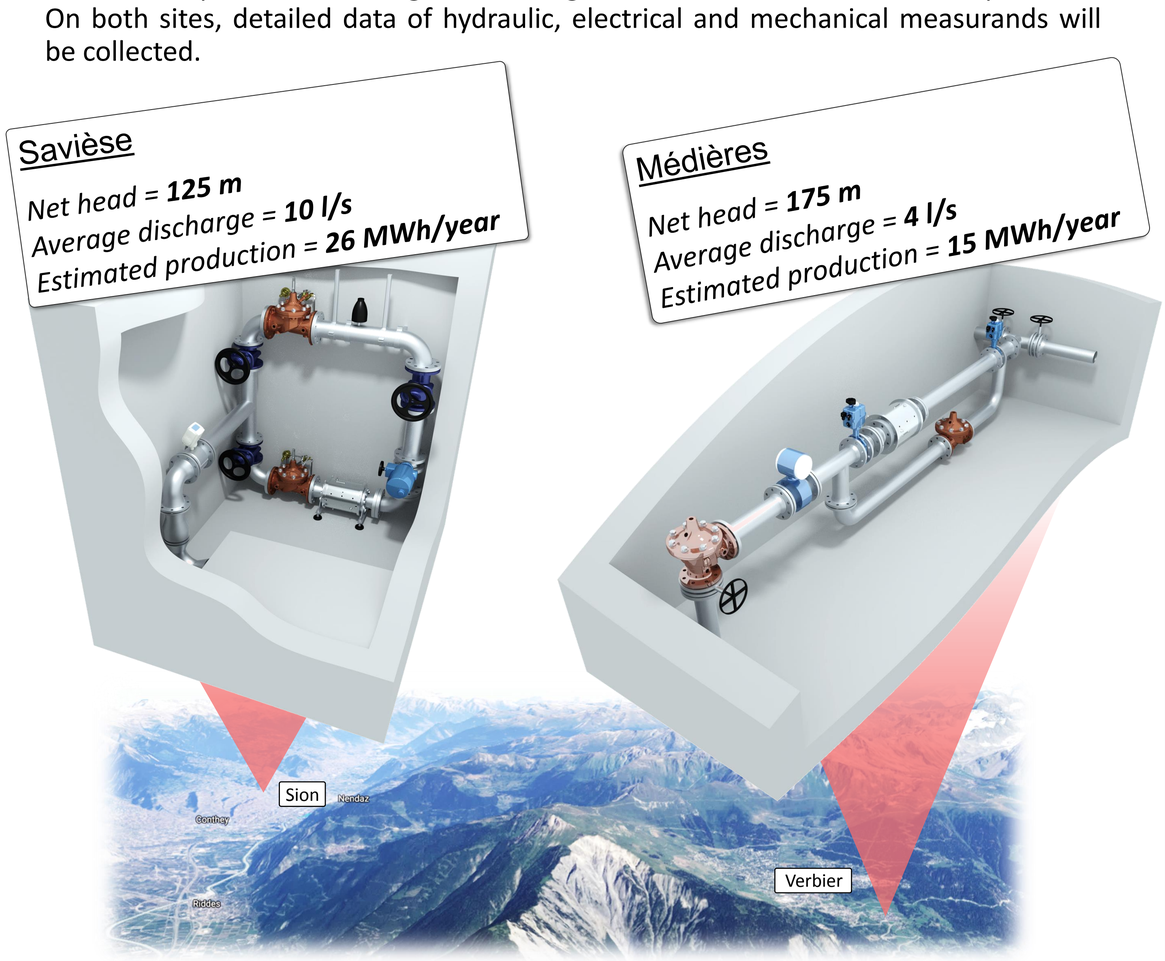
Laboratory tests

Detailed experimental investigations have been carried out on the hydraulic test rig of the HES-SO Valais//Wallis. A maximum regenerated electrical power of 6.5 kW was measured, reaching a global efficiency of nearly 60 % that corresponds to an enhancement of 14 % compared to the prototype V0. Additionally, the automation of the entire system, including the maximum power point tracking algorithm (MPPT), was successfully tested.



Pilot test sites

In 2018 two pilot sites are targeted for long term tests of the first DuoTurbo products. On both sites, detailed data of hydraulic, electrical and mechanical measurands will be collected.



Conclusion

To sum up the main achievements of the DuoTurbo project, ending in June 2018, a successful development of a new energy recovery system for future installations on many potential drinking water facilities can be mentioned. Passing from the prototype phase to the first operational product, significant enhancements concerning the turbine's lifecycle and performance were achieved. At the two pilot sites equipped this year, the robustness, expected efficiency and system stability under long-term operating conditions will be assessed.

References

- D. Biner, V. Hasmatuchi, D. Violante, S. Richard, S. Chevailler, L. Andolfatto, F. Avellan, C. Münch, **"Engineering and Performance of DuoTurbo: Microturbine with Counter-Rotating Runners"**, *28nd IAHR Symposium - Grenoble*, July 2016.

Development team of Duo Turbo (CTI Nr. 17197.1 PFEN-IW)

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