



Our passion, your solution.

Siphon turbine for ultra-low head sites (1.5 – 3.5 m)

Mhylab

Vincent Denis, Bruno Reul, Aline Choulot
Hydroenergia 2010, Lausanne



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Ultra-low head potentials

- Rehabilitations
- Adapted techniques: just recently
- Heritage maintenance
- Financing help for fish migration device





Siphon turbine®

Generator,
frequency
converter, speed
increaser,
Vacuum pump

Electro valve to break down
the vacuum and stop the
machine

Max. turbinable
Nominal
Square-inlet
section

Fixed guide vanes

4 fixed or
adjustable
blades

Outlet channel

Weir
-wall

Upstream level
Inlet channel

Downstream
level

Only the turbine inlet and the
draft tube are set in the weir wall

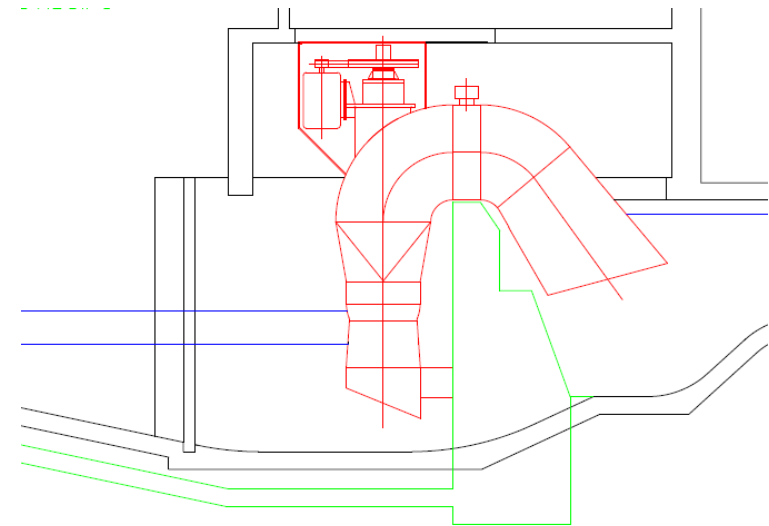


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Siphon turbine[®]: advantages

- Affordable technique, less expensive than bulb turbines
- Simple design
- Civil engineering = reduced to a simple weir-wall
- Mass-produced blades and runners
- High performances
- Low operation costs



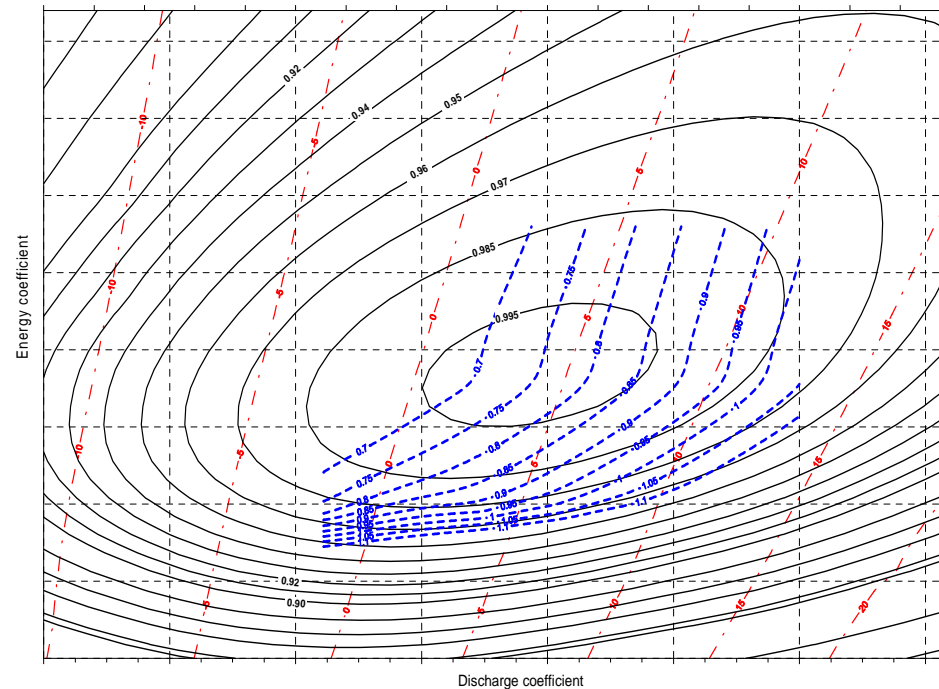


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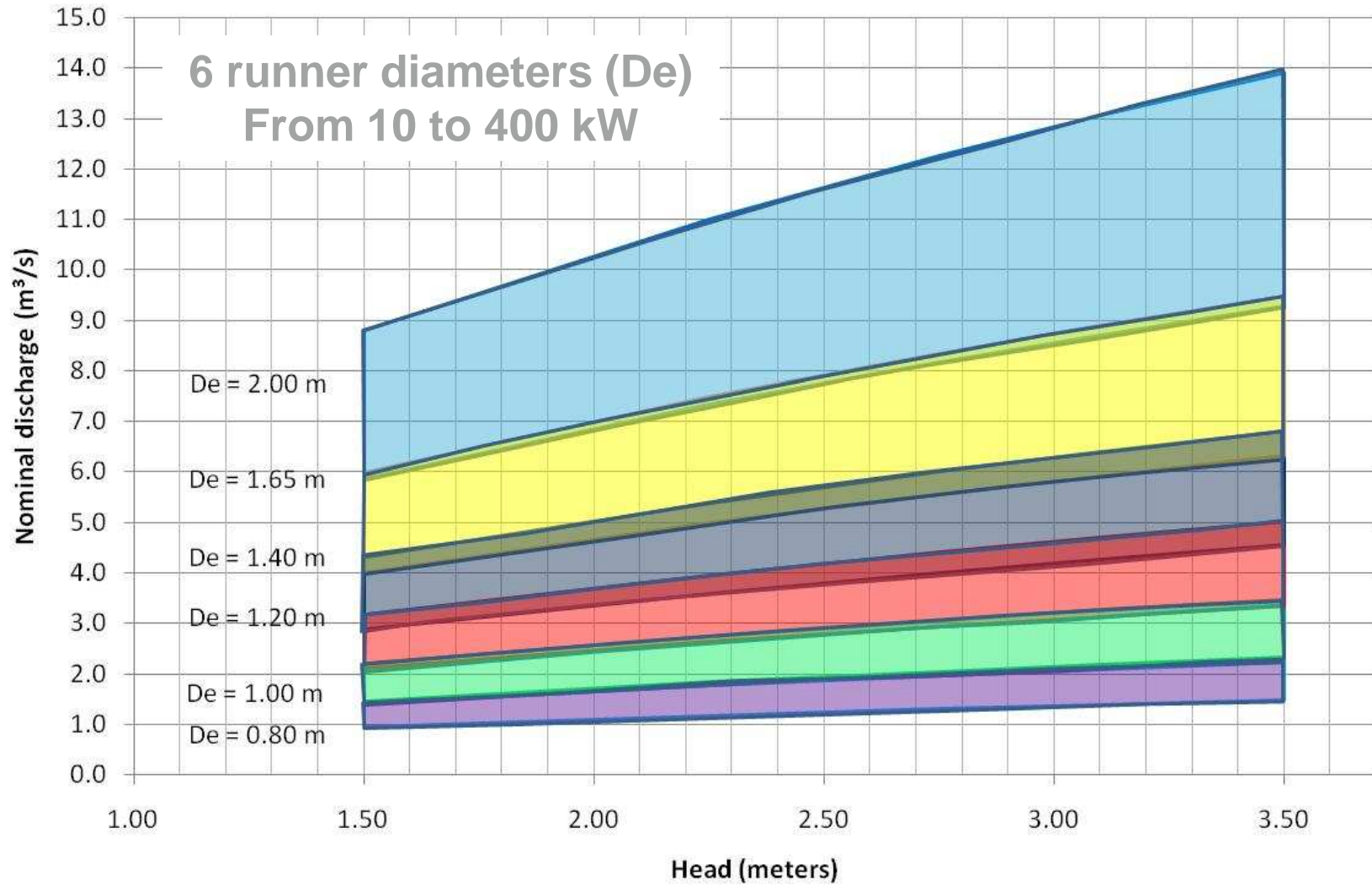
Laboratory development Base for standardisation



Mhyllab's laboratory



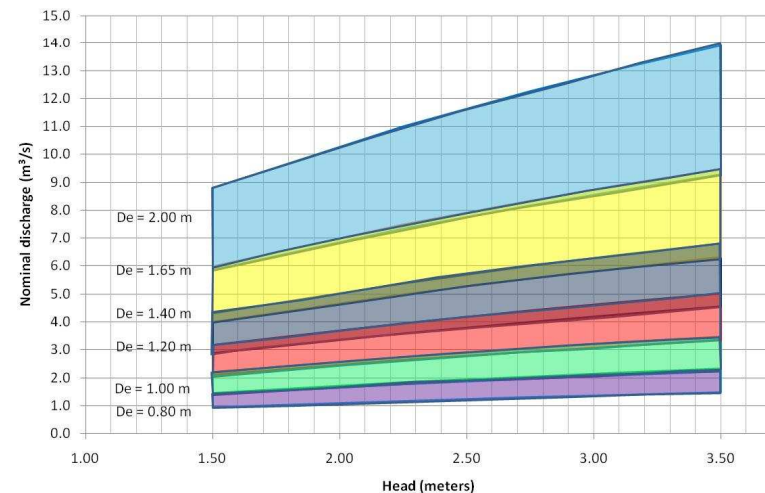
Hill chart for dimensioning and
efficiency guarantees



Siphon turbine[®]: Flexibility

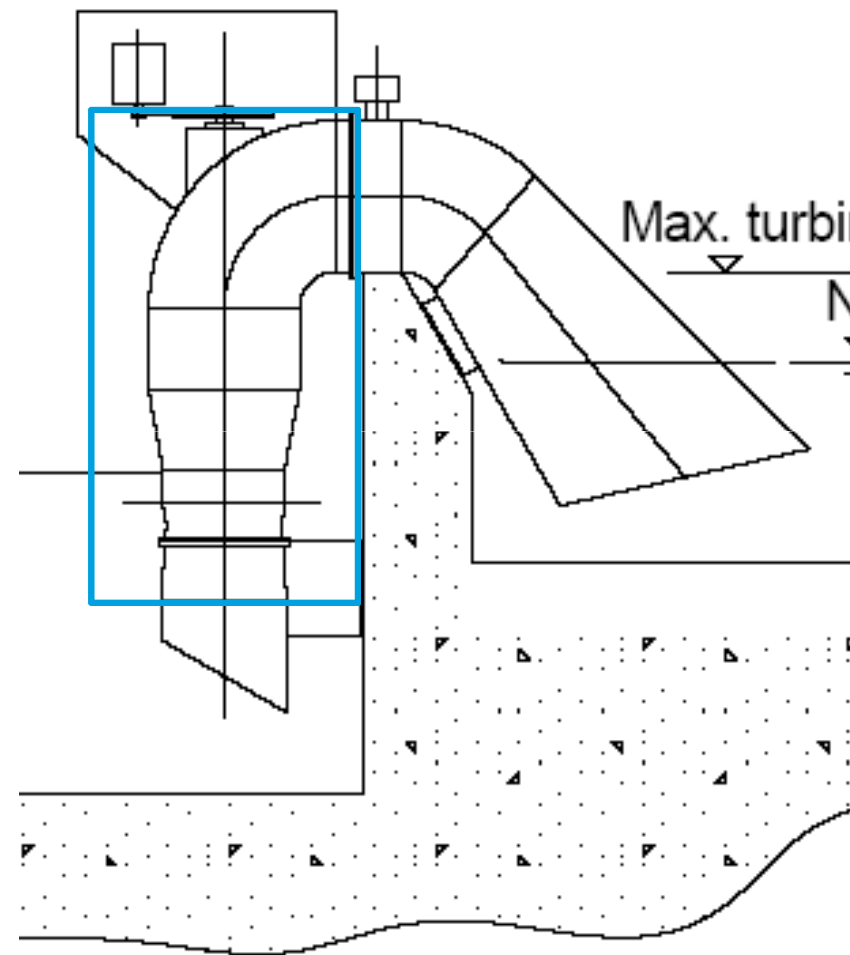
For the same runner diameter, adaptation to the site characteristics of :

- The rotation speed
 - The guide vane opening
 - The runner blade opening and its evolution
 - the number of turbines
- To optimise the production



Standardization and mass production from the inlet elbow to the first draft tube cone:

- Guide vanes
- Runner
- blades

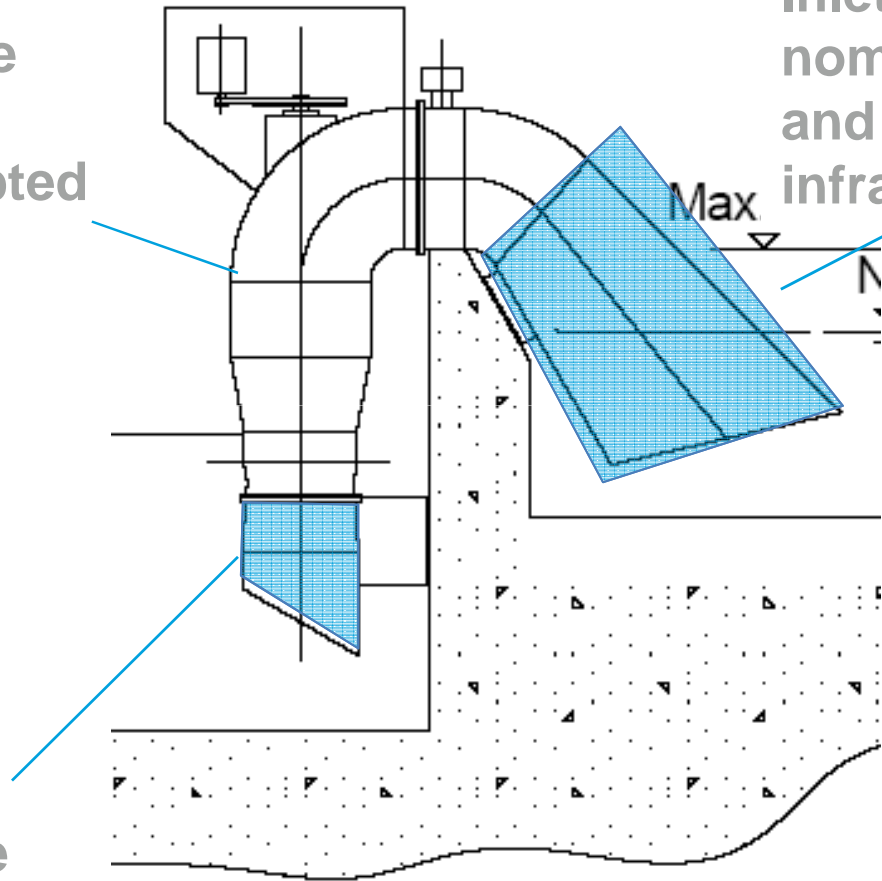




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Angle between the inlet axis and the turbine shaft adapted to the site

Inlet adapted to the nominal discharge and the existing infrastructure



Draft tube outlet adapted to the nominal discharge

Other setting: with an inclined axis

Site in the North East of France

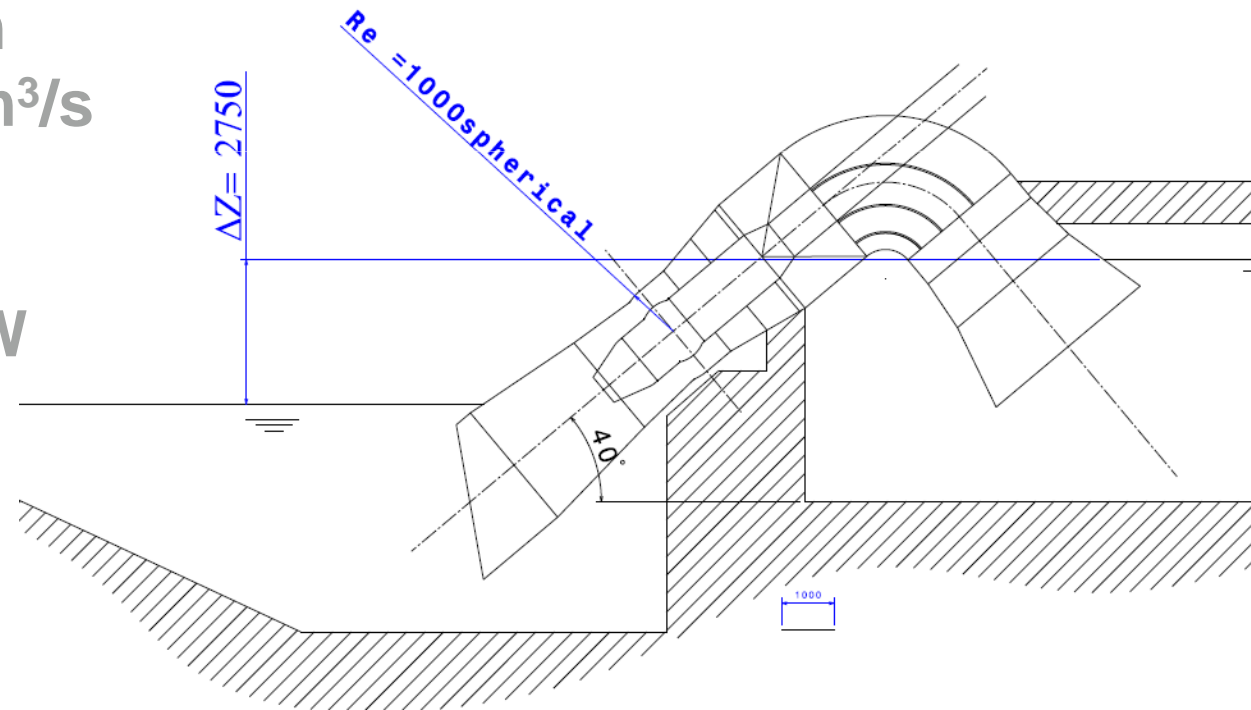
$\Delta Z = 2.75 \text{ m}$

$Q_n = 10.6 \text{ m}^3/\text{s}$

$D_e = 2.0 \text{ m}$

113 rpm

$P_e = 200 \text{ kW}$

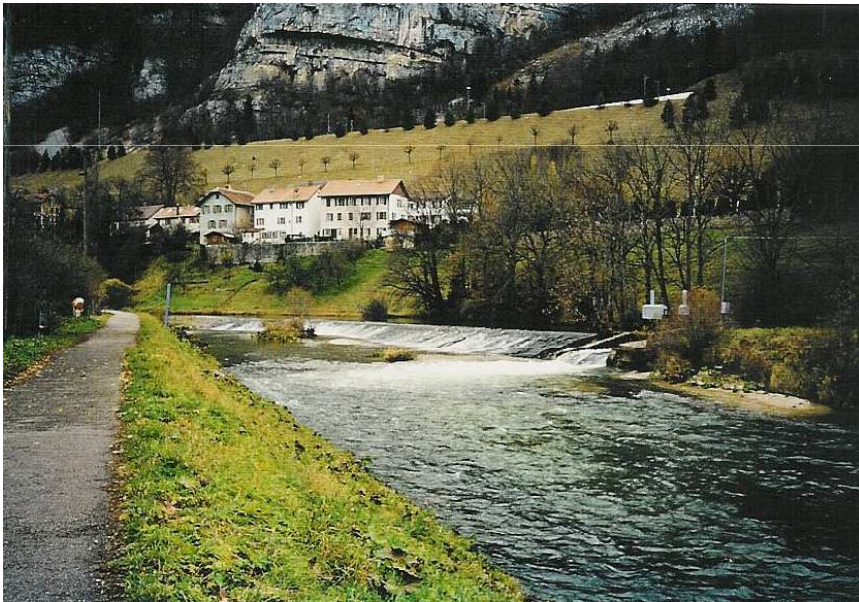




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Rehabilitation of the Moutiers site (CH)



First water right: 1893



2 siphon turbines on the Orbe river in Vallorbe



- Runner with 4 adjustable blade
- Commissioning year: 2009
- Gross head: 2.1 m
- Max. discharge per group: 2.5 m³/s
- Max. electrical output per group: 40kW
- Hydraulic design: Mhyllab (CH)

Feedback:

- 1.Foreseen performances: reached
- 2.Smooth start up and shut down
- 3.Good integration to the infrastructure



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Example of setting zoom on the generator



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The project marketing

Mhyllab : non profit-making foundation,

Independent of any manufacturers

→ Supplies the hydraulic profile and performances available for any manufacturers

The manufacturer: in charge of the mechanical design, manufacturing and marketing



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To know more



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