

Energy Sustainable Water Fountain

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This project focuses on the reduction of power consumption of water fountains, by the utilization of laminar and hollow jets, instead of traditional solid water jets. The project was carried out in collaboration with Fokdal Springvand, who was the original company requesting the hollow jet.

In order to produce laminar jets, a certain technique had to be utilized, in which water is slowly lead through a series of filters in a barrel, only to be accelerated by a sudden drop in barrel cross section. A mathematical model was created to assess the boundary layer build-up within the barrel, along with effects of surface tension and air pressure within the jet. This model revealed the need for air supply to the interior of the jet, and the barrel was fitted with a pipe reaching from the bottom where air could be supplied, to the top where the jet was ejected. In collaboration with Fokdal Springvand, a series of designs for the nozzles were drawn in CAD, and later manufactured out of stainless steel. The esthetics of the water jet varied with the different nozzle shapes, and the conclusion was, that the best result was with a sharp edged and conical-shaped nozzle, which angled the water slightly outwards when exiting the barrel. The water jet remained hollow and maintained its integrity up to a meter, before collapsing in on itself. Figure 1 shows a close-up picture of the hollow jet produced by the conical-shaped inner nozzle and a sharp-edged outer nozzle.

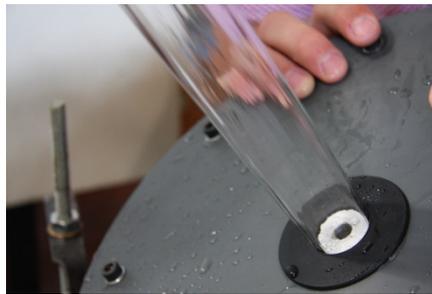


Figure 1: Laminar and hollow jet produced by conical nozzle

In conclusion the project showed, that it is indeed possible to make laminar hollow-jet fountains, and that the required power is significantly less than that of a laminar solid water jet fountain. However, there is a tradeoff with the esthetic.