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## **RAPID MANUFACTURING BY POLYJET TECHNOLOGY OF CUSTOMIZED TURBINES FOR RENEWABLE ENERGY GENERATION**

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### **Abstract**

In Romania, the small hydro power scheme (mini-, micro- and pico- hydro power) represents a potential renewable energy source for electrical energy. Nevertheless, this small hydro potential must be used efficiently. The paper proposes an innovative e-method of integrating design with manufacturing, for a small Pelton turbine. The first part presents the application of Rapid Product Development (RPD) with focus on Product Design (PD) of a new, very small customized hydropower turbine. This turbine, with an output of less than 5 kW, can be a good option for use in experimental research stands and for the electrification of rural communities. In the second part, applications of Additive Layer Manufacturing (ALM) technology, with focus on customized small hydro turbine, are presented. An experimental Pelton turbine was manufactured, using an additive manufacturing technology known as Polymer Jetting (PolyJet). The research was conducted at the Industrial Innovative Technologies Laboratory, within the Advanced Manufacturing Technologies and Systems (AMTS) research department. The paper shows how additive manufacturing technologies (AMT) can be used to build complex customized parts, such as new small Pelton turbines (for the pico hydro scheme), used in experimental research stands. It gives guidelines for designers wishing to follow a similar route.

*Key words:* Pelton turbine, PolyJet technology, manufacturing, rapid product development, renewable energy

*Received: March, 2011; Revised final: September, 2011; Accepted: September, 2011*

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