

# FUEL SYSTEMS DESIGN, LLC

**We are Fuel Systems Design LLC, a company set up by the late Professor Emeritus Vito Agosta, Ph.D.,** who spent his career on the faculty of New York University's Tandon School of Engineering, formerly Polytechnic Institute of New York. Professor Agosta was a leading researcher in the ammonia engine space.

During Professor Agosta's many years researching and implementing ammonia powered engines, he filed a number of fundamental patents on the combustion of alternate fuel mixtures. Two such patents remain in force and should be relevant to your hybrid ammonia/alternate fuel systems.

## THESE PATENTS ARE:

U.S. Pat. No. 8,915,218  
**(Fuel system and method for burning a liquid renewable fuel engines and boilers)**

U.S. Pat. No. 8,495,974<sup>1</sup>  
**(Fuel system and method for burning liquid ammonia in engines and boilers)**

The patents describe, for example, an innovative fuel system for retrofitting engines to burn hybrid ammonia/fuel oil mixtures, where the fuel oil could be diesel or other types of fuel including biofuels. The design provides several advantages over other fuel system designs, including:

- **Efficient Combustion:** The design produces efficient and rapid combustion of the ammonia/fuel oil mixture comprising the fuel emulsion;
- **Scalability:** The ability to run a large range of engine sizes from a single fuel system implementation; theoretically, the design could be implemented to cover anything from 1HP to 50,000HP;
- **Engine Cooling:** The fuel loop used in the design supports the use of the fuel mixture to cool the diesel head while avoiding vapor lock and cavitation;
- **Precise Mixing:** The design includes an innovative metering module that ensures correct mixing of the ammonia and fuel oil; and
- **Cost-Effective Retrofitting:** These benefits are easily implemented on existing engines by a cost-effective retrofit modification to an existing engine's fuel delivery system

---

<sup>1</sup>Awarded the Most Innovative Patent in Energy and Environment by the Long Island Technology Hall of Fame in 2014

These patents are not just academic; Professor Agosta implemented and tested a complete engine solution using the technologies described in the patents. This implementation used a 400HP Waukesha diesel engine.

These patents should be relevant to your business if you have or develop engines with applicable technologies. In particular, the '218 patent is directed to ammonia/alternate (e.g., diesel, biofuel) hybrid engines or fuel systems. The '974 patent is directed to all such engines that use some proportion of the fuel to provide a cooling function. You may wish to examine the patents to determine whether your company would like to purchase the patents or requires a license under the patents.

To ensure the continuation and exploitation of Professor Agosta's work, we are offering these patents for purchase or license. By purchasing or licensing this intellectual property, you will give your company an expanded protection under fundamental patents in the space and the opportunity to develop engines based on the principles described in the patents. Additionally, you will protect your company from a potential future approach for royalties or injunctive relief.

Please contact us at  
**[licensing@fuelsystemsdesigncorp.com](mailto:licensing@fuelsystemsdesigncorp.com)**

For more information, please visit  
**[www.fuelsystemsdesigncorp.com](http://www.fuelsystemsdesigncorp.com)**

