

ELSAU: HUG ENGINEERING AG ON EXPANSION COURSE

# Innovations to Reduce Toxics in the Air



Photo: Heinz Diener

Protecting the environment technologically: brothers Hans Thomas (left) and Christoph Hug.

**Systems designed by Rümikon-based Hug Engineering AG are used around the globe to reduce emissions of power plants, ships and locomotives. A new development can make even older diesel-powered vehicles cleaner.**

by BARBARA STEINER

Diesel engines do not enjoy a great reputation. They are widely considered economical but unclean. In fact, when compared to other thermal power engines, they fare poorly in terms of toxic emissions such as nitrogen oxide carbon monoxide and hydrocarbons, as well as soot – unless the engines are equipped with an emission reduction system, which significantly lowers the output of toxics. Among the world's leading manufacturers of systems of this kind is Hug Engineering AG. Two years ago, the company moved from Weisslingen to the Elsau district of Rümikon [in Switzerland]. In about 80,000 square feet, its various departments develop, plan, test, for the most part produce and assemble emission reduction systems. Much of the production

equipment utilized here has been custom-built for the company – for instance, the press that forms “honeycomb” structures from a specially formulated ceramic mixture, which feels like clay but is composed mainly of metal oxides. Integrated into a reactor, the catalytic surface of these honeycombs – simply put – causes toxics to be broken down into non-toxics. Using filter elements, soot is held back and then catalytically incinerated. Once the honeycombs have outlived their usefulness, after approximately 10 years, the manufacturer takes them back, cleans them chemically, grinds any remaining useful material in a specially designed mill and reuses it. Optimal production and management of the various honeycomb inventories is one of the logistical challenges faced by the operation, says Hans Thomas Hug, Hug Engineering AG's CEO and chairman of the administrative board.

#### Commercial Boats and Greenhouses

Twenty-one years ago, when he founded a one-man consulting firm for power plants, Hans Thomas set the course for the enterprise of today. In 1988, three years after the first Swiss clean air act went into effect, the Schaffhausen power plant installed the first emission reduction

system of his design. Later, Hug successfully advanced the technology embedded in this equipment, which is still in operation. Today, a total of 1,300 Hug systems clean the emissions of stationary and mobile diesel and gas-fueled engines around the world. For smaller power plant engines, Hug says, the company is practically without competition. In the area of ferry and boat engines, Hug Engineering AG holds a market share of approximately 50 percent. Many orders for marine uses come from Scandinavian countries, where the emission regulations are particularly strict. Important customers also still include manufacturers of diesel locomotives and, for the past 10 years users of large-scale greenhouses such as the kind found in Holland, which rely on Hug Engineering systems to feed plants with growth-enhancing carbon dioxide at less than the original cost. The CO<sub>2</sub> is extracted from the highly cleansed emissions of the gas fueled engine, which generates power for the green house. By contrast, the NO<sub>x</sub> removal system for diesel-powered vehicles co-developed by Hug Engineering (see box), which was presented at the Rapperswil Academy yesterday, is not yet commercially available. Hug Engineering AG gladly and frequently collaborates with educational institutions,

says Christoph Hug, the chief technology officer and a member of the administrative board. The benefit of these collaborations is mutual. Aspiring engineers appreciate being involved in concrete projects, and the company acquires low-cost test data.

#### Value Added in Switzerland

Today, aside from Hug Engineering AG, the Hug Group includes H + S Metallbau, AG, based in Winterthur, a German subsidiary and Hug Infra AG as the holder of interests, real estate and capital goods. It is home to more than 70 employees but has remained a family enterprise: the brothers Hans Thomas, Christoph and Michael Hug are in charge. The group's annual sales total between 20 and 25 million Swiss francs, says Hans Thomas Hug, and are expected to grow further. At the Winterthur location, he appreciates, among other things, the great potential inherent in well-trained personnel. While manufacturing costs are still higher than elsewhere, Hans Thomas Hug knows that even higher-priced products can succeed on the market as long as their quality is noticeably superior to that of lower-cost alternatives. It is important, he says, that the lead on competition is maintained through improvements and innovations, while lobbying efforts exert

## Old Buses Run Cleaner, Too

Hug Engineering AG, in cooperation with the Institute for Applied Environmental Technology [Institut fuer angewandte Umwelttechnik (umtec)] of the Rapperswil SG Academy, Wilder Bus Halter Management AG and Larag, which is based in Wil and has a Neftenbach branch, has developed a NO<sub>x</sub> removal system, which can reduce the output of nitrogen oxides – ozone precursors in the chemical cycle – of heavy diesel-powered vehicles, such as trucks and buses by up to 90 percent. The system is designed for use particularly in older diesel engines. In practice, this technology has already proven itself. For 18 months, a ten-year-old passenger bus equipped with the new NO<sub>x</sub> removal system has been criss-crossing Wil. It also features a conventional soot filter. Of the development costs of the new system, 60 percent are carried by the private partners. The Swiss Federal Office for the Environment, Forests and Landscape [Bundesamt fuer Umwelt, Wald und Landschaft (Buwal)] pays for the rest as part of its program to promote environmental technology. As Buwal director Philippe Roch explained yesterday during the press conference in Rapperswil, this program was founded in 1997 to facilitate the marketing of environmentally friendly products and processes for the benefit mostly of small and medium-sized enter-

prises. The number of buses that will eventually be equipped with the new system is still a matter of debate. Hug Engineering AG is talking to several companies, says Christoph Hug, the chief technology officer and a member of the administrative board. Demand determines the price as well. For individual installations, the new NO<sub>x</sub> removal system with soot filter runs in excess of 30,000 Swiss francs. If large numbers were produced, the cost of this environmental measure would be significantly reduced. However, as Hug pointed out, the window during which the NO<sub>x</sub> removal system can be marketed is limited. New engines already reflect current emission limits and thus do not need to be upgraded. The regulations for diesel engines have been tightened step by step since the early '90s. Today, the Euro-3 norm is in effect – in the year 2009, it will be the Euro-5 norm, with which the Wil bus, thanks to the NO<sub>x</sub> removal system, already complies. Hug Engineering AG is now weighing the question of whether the new development may be applied to locomotive and boat engines as well. In addition, the company wants to market components and know-how to engine manufacturers.

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pressure on politicians to pass environmental legislation to the extent technologically possible. However, the Hugs do not regard themselves as Green Party followers. “We are businessmen and see an opportunity to protect the environment through technology.” At first glance, they say, people do not recognize the viability of investments in emission and toxics reduction because they represent additional costs in the short term. However, in the long term, these investments may prevent damage that is far more expensive and create jobs in the meantime. “To appreciate that this is good for the economy, you don't have to be green.”

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