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SONDERDRUCK

MTU manufactures engine components for Pratt & Whitney, GE Aerospace and others. The Harter drying solution raises energy and production efficiency and is easy on the environment.

Innovative Drying Technology for Aircraft Engines

The precision and quality of engine parts is of utmost importance in the aircraft industry. The uniform drying of such parts is particularly critical in the electroplating process. The integration of heat pump drying technology offers a highly efficient solution which does not only reduce drying periods but also optimises temperatures while helping to save much energy.

Advanced Drying for Engine Manufacture

Major aircraft industry companies use advanced and reliable technologies to meet the high requirements imposed on the manufacture of engines. This is also true for MTU Aero Engines, Germany's leading engine manufacturer based in Munich. MTU is specialised in manufacturing components for renowned engine manufacturers such as Pratt & Whitney and GE Aerospace. The company requires efficient and reliable drying to produce their engine components. The drying process of such complex geometries, however, shall be such as to minimise energy consumption, temperatures and heat impact on the parts. MTU also makes a point to ensure sustainability. To meet all these requirements MTU have co-operated for many years with the German drying system manufacturer Harter.

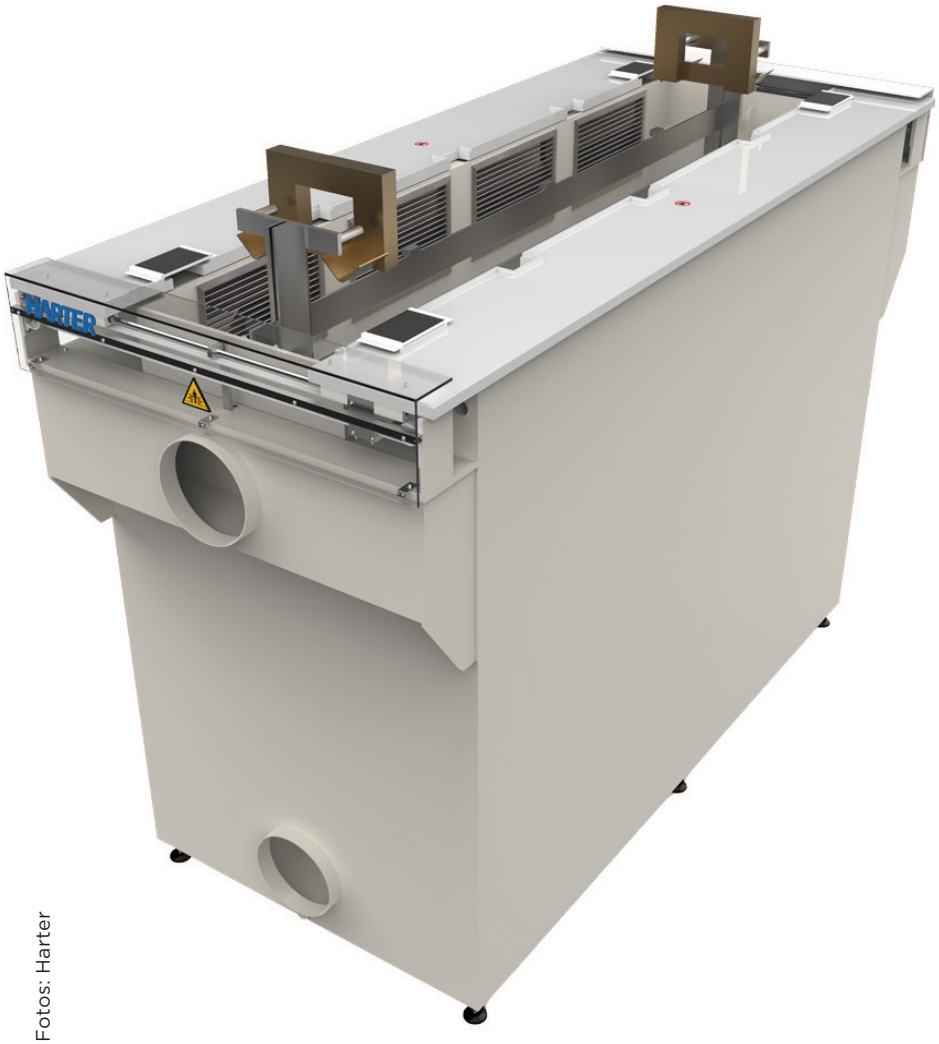
Heat Pump Assisted Drying as Key to Raising Efficiency

Listening to a speech held by Reinhold Specht, managing owner of Harter, at a convention of Deutsche Gesellschaft für Galvano- und Oberflächentechnik (DGO) [German Association for Electrochemical and Surface Technology] Josef Linska, process engineer for chemical and electroplating processes at MTU, first took notice of Harter's innovative heat pump assisted drying. From this time on, MTU have exclusively relied on Harter's solutions. Prior to implementation in the production process, Harter conducted comprehensive tests of engine components in their own Test Center. Subsequently, additional tests were run in Harter's Test Center in close co-operation with MTU. The purpose of these tests was to ensure that the drying parameters were best harmonised and that the technology was adapted to meet MTU's specific requirements. Harter's Test Center is equipped with several dryers that can be used to determine the relevant parameters such as time, temperature, humidity, air speed. MTU's goal was to ensure gentle and uniform drying at 70 °C maximum. In the tests conducted, Harter could even surpass MTU's expectations. The engine parts were rendered completely dry after only ten minutes at 50 °C (ref. fig. 1).

These tests confirmed that Harter's heat pump technology is not only capable of optimising temperatures and reducing energy consumption drastically but also reducing drying periods significantly.

Advanced Heat Pump Assisted Drying for Complex Geometries

Harter has already installed several rack dryers in MTU's electroplating lines. Another rack dryer was now installed to increase capacity. Harter's rack dryers include an energy efficient heat pump. The drying process ensures absolute freedom from exhaust air. There is no process air released to the environment. Instead, the process air continuously circulates in the system which reduces energy consumption considerably and is beneficial to the environment. Moreover, Harter's dryers feature an air routeing system customised to meet the special design of the engine parts. „A special challenge is the geometry of our parts because they feature narrow corners and undercuts", explains Linska.



Fotos: Harter

Fig. 1: Aircraft engine components are gently and completely dried within ten minutes at 50 °C.

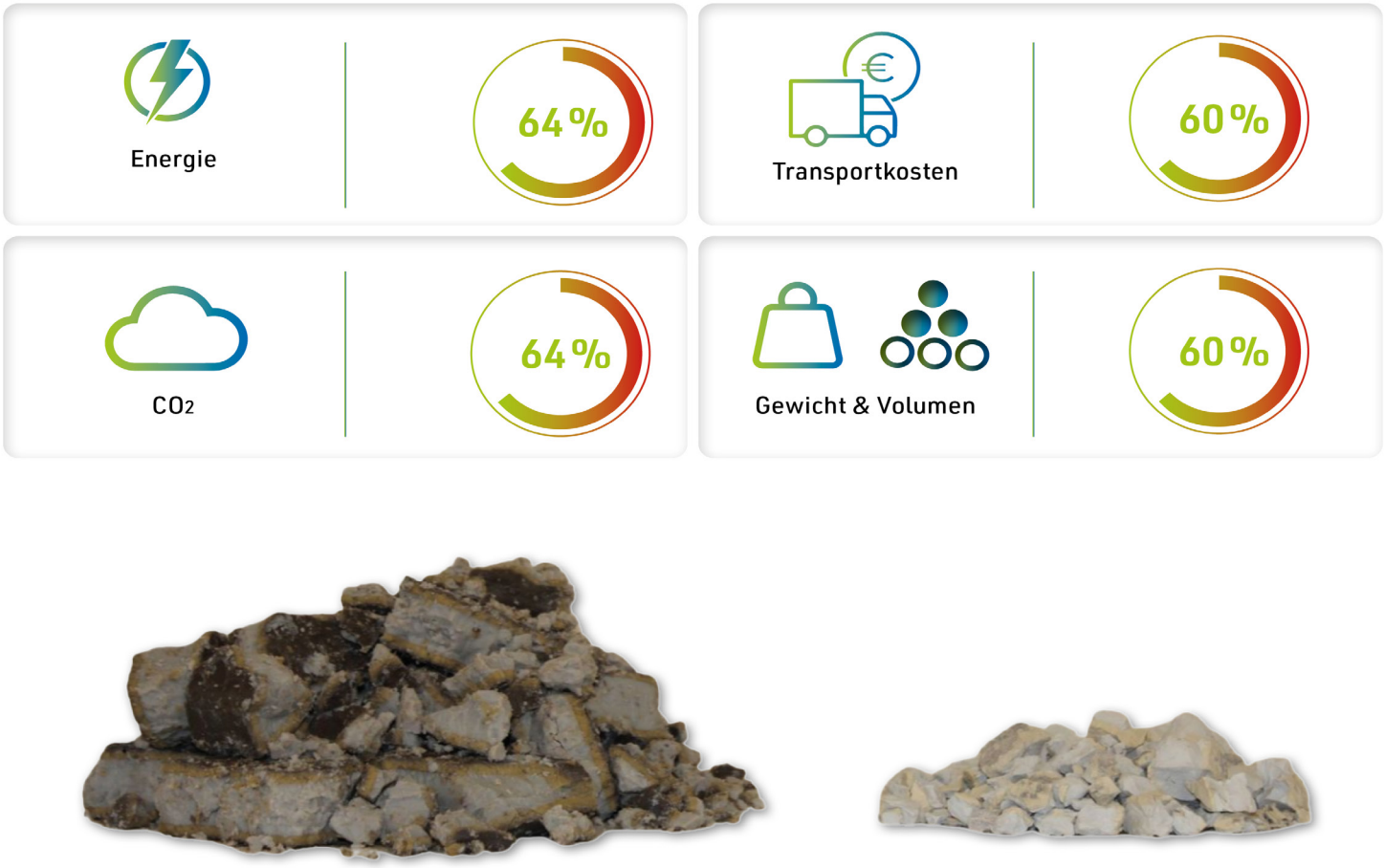


Fig. 1: Aircraft engine components are gently and completely dried within ten minutes at 50 °C.

„Precise air routeing ensures that even very complex parts are uniformly and rapidly dried without any humidity entrapment or non-uniform drying results “, explains Specht. This technology meets the high standards required by MTU for their engine parts and is instrumental in ensuring production efficiency and sustainability.

Sludge Drying with Heat Pump Technology

MTU also decided to realise another innovative project in conjunction with wastewater management. Again, they use Harter's heat pump assisted drying to efficiently process pre-dewatered sludge. The resulting reduction of disposal and transport cost is considerable (ref. fig. 2). Following mechanical dewatering, the sludge still contains some 60 % to 70 % of water. Using Harter's heat pump technology MTU can reduce the water content of the sludge considerably. In the future, MTU will dry one ton of sludge per day. Harter's draft design provides for drying the sludge directly underneath the mechanical dewatering station. Special drying containers will be installed there to dry the

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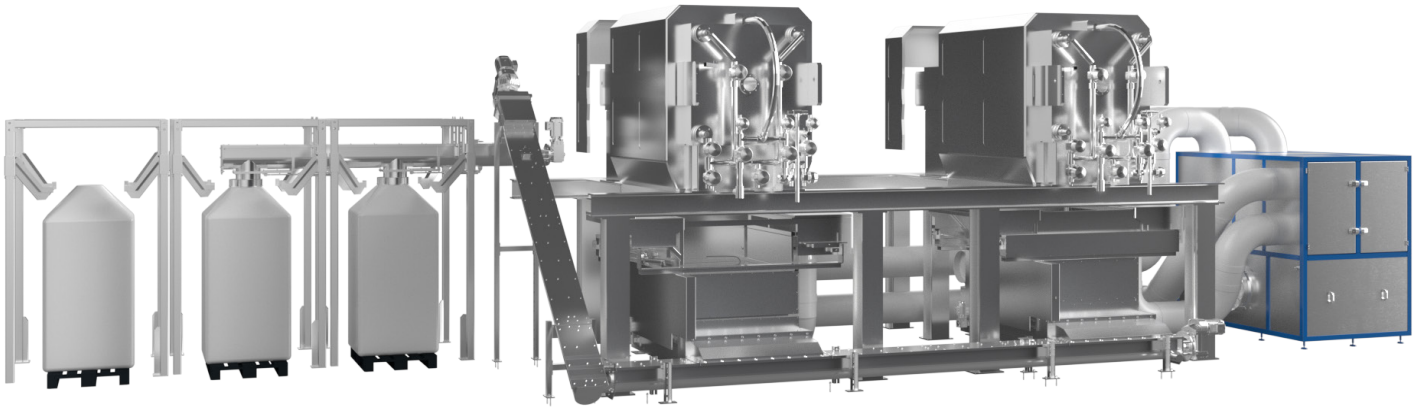

Fig. 3: Sludge from the two chamber filter presses is gravity fed into the drying containers placed underneath. Once dried, the sludge is automatically conveyed to the big bags of the discharging station. The dehumidification module on the right conditions the required process air.

sludge therein. Again, the whole drying process will take place in a closed air system without any exhaust air implied. Following drying, the sludge is passed through an auger to the filling station for automatic and dust-free filling into big bags. This process does not only result in appreciable cost reduction but also in sustainable and efficient optimisation of the whole sludge drying process (ref. fig. 3).

Heat Pump Technology for Efficient Component Drying

„The alternative physical approach pursued by Harter with their heat pump fascinated us from the beginning“, states Linska.
„This technology was entirely new to us.“ The success of the system rests on two essential pillars. One is air dehumidification. Harter uses highly dehumidified process air. This extremely dry and thus unsaturated air is passed over the items or through the sludge to be dried in the dryer. The heat pump module attached to the dryer conditions the process air and is also responsible for the condensation process. Dryer and module are connected through insulated piping. This is a closed air and energy circuit. The other pillar is targeted air routeing which is equally important. Specht explains: „Air always moves along the line of least resistance. Therefore, it must be forced precisely onto the parts or evenly through the sludge to absorb humidity well and fast.“ For components with complex geometry, Harter uses an additional non-compressed air blow-off station for parts with complex geometry. Air blow-off removes water even from surfaces not readily accessible. Air blow-off used in preparation for or in support of drying does not, however, replace drying. Harter dryers with integrated heat pump technology technology received government recognition as future fit technology in 2017. Customers have profited from government subsidy for this energy efficient solution ever since. MTU, too, received such subsidy.

Long-lasting Successful Partnership

„We are very satisfied with the solutions Harter has always supplied so far“, emphasises Linska. „The dryers have not only improved our production efficiency but also helped to reduce our energy cost.

Moreover, our drying systems constitute an environmentally friendly solution that perfectly fits in our sustainability policy.“ Specht, too, looks back on many years of positive partnership. „MTU is one of our important customers. We are proud of the customised solutions we developed to meet both the engineering requirements and the environmental specifications“, he states.

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