Many wastewater treatment plants are coping with a waste stream of digested sludge. The sludge is normally dewatered by means of a centrifuge or belt filter press. After dewatering the sludge has a typical dry solids content of approx. 20 - 25%, which is very suitable for thermal treatment in a GMF-Gouda paddle dryer.

The heart of the installation consists of a trough containing two counter rotating shafts, arrayed with paddles.
Thermal oil or saturated steam of 180 - 250 °C flows continuously through the jacket, hollow shafts and paddles. As the sludge feeds in, the wedge-shaped paddles ensure perfect local mixing and mechanical fluidisation. The shafts are precisely aligned, and thus enable the paddles to interweave as they turn. This ensures the ideal surface to product contact and sludge flow, leading to high evaporation rates per square meter inside the machine.

**Indirect drying**

The paddle dryer is based on a system of indirect sludge heating. The indirect heat transfer avoids air flows while the fully enclosed operation enables the safe treatment of toxic, noxious or flammable products. Due to the low operating speed of the shafts, little or no dust is formed during the drying process, while wear of the installation is reduced to a minimum. Another advantage of the indirect drying system is its low energy consumption as all heat is used to evaporate the water.

**Flexible on different sludges**

The Royal GMF-Gouda paddle dryer offers a once-through drying technology that avoids back-mixing. The long sludge retention time combined with the average sludge temperature of 100 °C make it possible to provide pasteurisation and sanitary treatment of sludge. Due to the process any type of sludge is accepted by this machine which makes it extremely suitable for centralized drying plants, accepting different sludges from different regions. As back mixing is not required, any rest moisture can be chosen for the end product. This makes the machine extremely suitable for partial drying to 35 - 40% dry solids, which is required prior to incineration of sludge.

**Vapor treatment**

All evaporated water is fed to a wet scrubber without adding sweep gas. This means that the volume is limited to the amount of water vapor created in the dome of the dryer. The small amount of non-condensibles in the exhaust vapours can be post-treated to minimize the emissions to an absolute minimum.

The whole unit is installed at a slight incline, and the sludge flows by gravity alone to the opposite end of the installation for discharge. The dried sludge -with a dry solids content of 90 - 95 % - is conveyed by means of cooled conveyers into a dry sludge storage silo, with a safe temperature of far below 40 °C. The dried product can be used for several applications like a composting component for the agriculture or as an alternative fuel for combustion processes.

**Process solutions**

The Royal GMF-Gouda paddle dryer comes in a variety of sizes, ranging from 1.5 m² of heat transfer area to a mega processor with an interior of 300 m² and a water evaporation capacity of 6 tonnes/hr for sludge. More than 220 Royal GMF-Gouda paddle dryers are operational around the world, of which 30 units are used for municipal sludge drying. Apart from the paddle dryer Royal GMF-Gouda also realizes total process solutions - from dump station for digested sludge to loading station for the dried sludge, including sludge conveyors, wet sludge tanks, vapour handling system, sludge distributor, sludge cooler, pelletizer and truck silo.

**Royal GMF-Gouda**

For more than 100 years Royal GMF-Gouda realizes total process solutions for the environmental, chemical and food industry. Being machine manufacturer as well as process solutions expert, Royal GMF-Gouda is able to handle all stages involved in designing and building plants, including engineering, service, installation and commissioning.

Royal GMF-Gouda has several pilot plants available to test new materials, generate design data and provide representative product samples. The proven calculation model for scaling up to industrial size ensures successful application to real life processing.