

## Powerful and Quiet Helical Gearbox Drives

### Drives “Quiet-as-a-Whisper” for Pellet Conveying on Stoves

A low cost and environmentally friendly alternative to conventional central heating systems and open fireplaces is available with pellet stove systems in fireplace design. These innovative heating systems incorporate all components of a central heater including hot water boilers. For conveying of pellets on these stoves, OEM opt for low noise helical gearbox drives from ABM Greiffenberger.



*Application Example: Wood Pellet Powered Stove in Living Quarters*

For many people a warm stove is the embodiment of complacency; and even better if the stove has an attractive design. The heating system shown on the left appears to be a high-grade stove but the attractive façade hides a complete wood pellet powered central heating system with hot water boiler. The stove will be placed in the living quarters eliminating the need for a separate heating room

Comfortable sense and living comfort can now be combined with outstanding values of space saving designs and use of lost stove heat. Additionally, wood pellets allow with their high energy density CO<sub>2</sub>–neutral heating with a local energy source.

### Special Requirements for the Pellet Conveying System

Especially tough requirements are placed on the drives of pellet conveying systems for rotary valves and inclined augers: In difference to applications where heating systems are located in separate rooms operating noise is of extra concern. Ultimately

these stoves are placed in areas where one wants to enjoy the warmth but also likes to have a conversation – and this without annoying background noises.



*Whisper Quiet ABM Helical Gearbox  
Motor FGA 53*

Helical gearbox drives type FGA 53 from ABM Greiffenberger proved themselves in these acoustically sensitive areas. ABM Greiffenberger, a specialist for the development and manufacturing of high grade electrical drive systems, has vast experience in production of among other things energy efficient drives for biomass heating systems. This program is now expanded with a drive system that also fulfills the highest demands on low noise operation.

### **Drive Development Goal: Whisper Quiet and Still Powerful**

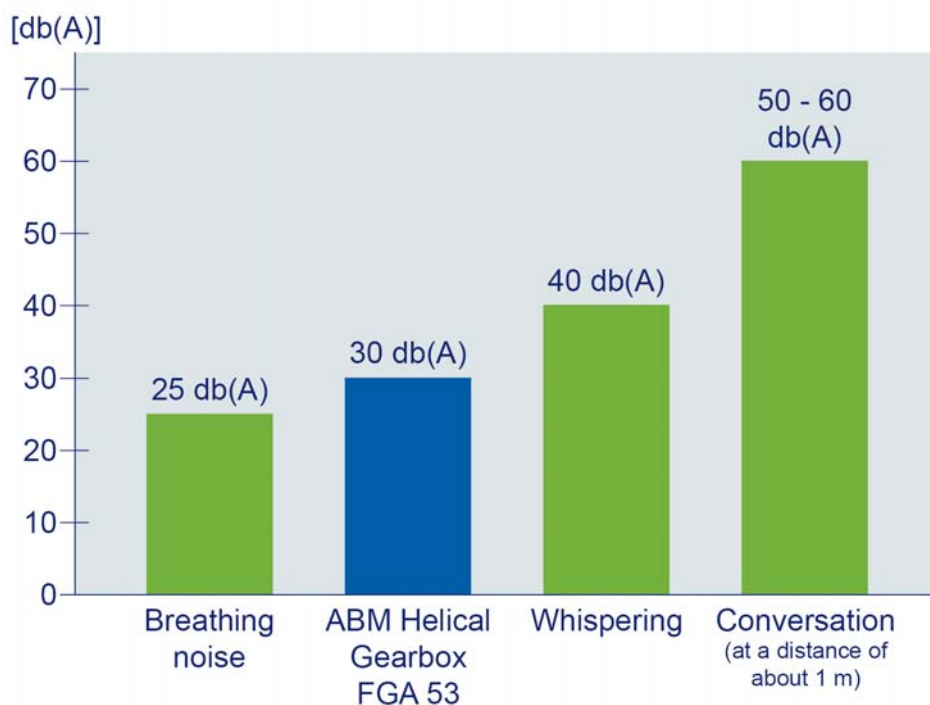
The goal „as little noise as possible“; definitely is a challenge for engineers because many factors have an impact. First the gear teeth must be manufactured very precisely. On the FGA 53 series noise optimized tooth geometry is being applied with reduced (and compensated for) single impact impulses. The gear teeth in the high speed stages are ground further minimizing gear box noises.

Another aspect to be considered on noise emissions is the adaptation of single drive components. Here it is a benefit that ABM Greiffenberger as a systems supplier does not only have full systems control but also manufactures all key components such as housings, electrical motors and gearing in house. This provides for example the condition to directly integrate the motor housing into the gearbox body. Interface between motor and gearbox is eliminated and the housing can be machined in one set up. This design eliminates necessary interface tolerances and prevents the occurrence of undesirable vibrations and noise.

## High Grade AC Induction Motor

For these drives ABM Greiffenberger uses an induction motor with high startup torque. High balancing quality prevents out-of-balance of the rotor – an important condition for outstanding quietness. Thanks to precise manufacturing, concentricity errors are minimal. The powerful motors have outstanding efficiencies guaranteeing energy efficient operation. If motors are properly designed for the duty cycles (i.e. run and cool down times) fan ventilation will not be needed with a welcome result: Elimination of fan noise.

The benefits of these design features become obvious during final quality inspection. In inspection procedures defined with customer input, noise (airborne sound) as well as vibrations (impact sound) can be measured and documented. The results are impressive: The drives have a sound level of 30 dB(A) at a measuring distance of 1 m. Impact sound analyses result in a mean value of 0.5 m/s<sup>2</sup> measured over a frequency range from 2 to 10 kHz. Looking at the sound level comparison chart below, one can speak in earnest and without hyperbole about whisper-quiet and low vibration drives.



### Noise Level Comparison

(Origin: [www.http://www.dresden-airport.de/en/struktur/umweltschutz/laermmessung/vergleich\\_.html?newLanguage=en](http://www.dresden-airport.de/en/struktur/umweltschutz/laermmessung/vergleich_.html?newLanguage=en) (08.12.2008))

Another benefit of the helical gearbox type FG53 is a compact design allowing their use even in tight compartments. Maximum output torque of 50 Nm assures that these drives can handle pellets that need to be sheared off from the rotary valves. There are seven different gear reduction ratios available ranging from 70 to 314. The motors have outputs from 25 Watt ( $i=314$ ) to 90 Watts ( $i=70$ ).

### **Summary: Ideal Drives for Wood Pellet Conveying**

The stated features make the type FGA53 and ideal drive for conveying wood pellets to stoves; one can hear the fire crackling but not the drive running. Additionally, the ingenious motor-gearbox concept assures reliable and maintenance-free operation and outstanding efficiencies conserving money and environment. At the same time a high output torque guarantees that pellets are reliably supplied and the compact envelope offers new design freedom to stove OEM's. If despite its entire features one still cannot decide to acquire such an innovative heating system, it is still possible to take advantage of ABM Greiffenberger's drive technology. The company also offers comprehensive lines of drive systems for wood chip and pellet heating systems that are installed away from the living quarters.

ABM Greiffenberger was from the beginning an integral part during the development of biomass heating systems and can offer now to OEM's of such systems a comprehensive program optimally adapted for specific applications e.g. inclined augers and rotary valves:



*ABM Hollow Shaft Line*

Hollow Shaft Gearbox line FGA available with reduction ratios up to  $i = 1500$  and output torques up to 1350 Nm with large shaft center distance for u-shaped mounting.



*ABM Helical Gearbox*

2- and 3-stage helical gearboxes type G with reduction ratios up to  $i = 550$  and output torques up to 3000 Nm.



*ABM Agitator Drive*

Agitator drive type SGS 125; a ready to use gearbox solution with a reduction ratio of  $i = 15,667$  and output torque of 2000 Nm.

Heating System OEM's can now purchase all their drives for biomass systems from a single source ABM Greiffenberger – optimally engineered for each application and in top quality.

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