Silentium Drive

The silent conveying solution for combine feeder houses
The feeder house delivers crop material from the header of the combine into the threshing area. The material collected over the large width of the header needs to be reliably channeled through the narrow feeder house between the front tires of the combine.
State of the art all steel roller chain with cross bars/slats accelerates the crop material and the surrounding air to high velocity and conveys it into the threshing area.

The commonly occurring asymmetric and fluctuating loading with crop material, the picking up of foreign matter, large objects/rocks, dust, dirt and weed causes constant warping and cocking of the chain. In conjunction with the very high chain speed a tremendous load is put onto the chain. Subsequently, the inflexible all steel chain and its drive components inevitably wear quickly and excessively.

Constant care, monitoring and adjustments of the chain are required by the operator to ensure efficient operation. Otherwise unplanned downtime and costly in-field break downs will occur.

The useful life of the current systems are therefore limited. Such systems have been in use over decades in combines with only minor improvements.
Feeder house chains – state of the art (III)

**General characteristics of conventional roller chain**

- Rigid, inflexible all steel conveyor system
- Regular re-tensioning required
- Constant monitoring of the system required
- Limited longevity
- One of the main sources of high noise emissions of a combine
- Noise source located directly under the driver’s cabin
- Little tolerance in correctly adjusting/tensioning the chain

**Typical areas of concern caused by wearing are**

- Increasing noise levels
- Chain jumping on sprocket teeth
- Excessive sprocket wear
- Reduced harvesting speed
- Premature threshing
- Grain damage
- Feeder house plugging
- Risk of instantaneous failure causing costly in-field break downs

**Broekema** now offers a solution that eliminates these problems.

**Silentium Drive** - the innovative feeder house conveying solution
Silentium Drive Concept

The Silentium Drive system is based on rubber traction belting that replaces the steel roller chain.

The belting is made either truly endless or with a special joining method.

The mounting bolts for the slats are vulcanized into the belt for an optimal connection between belt and slat.

The drive system used in the Silentium Drive is the Broekema N-type which drives the belts in the cam.

The return roller is modified to accept flanges that insure proper belt tracking.

Any major brand combine companies can be easily converted to Silentium Drive. Only a few components need to be either replaced or modified.
Silentium Drive Characteristics

General characteristics of Silentium Drive

- Very smooth conveying action
- Low noise level due to elimination of metal to metal contact of moving parts
- One of the main sources of noise under the driver’s cabin is eliminated
- Ultra-high dynamic strength parabolic traction belting
- Manufactured by a specialist rubber company with decades of experience in crop conveyor belts
- All common brand combines can generally be converted to Silentium Drive

Value added by Silentium Drive

- Very little wear due to elimination of metal to metal contacts of moving parts and constant tension
- Higher chain speed and increased conveying capacity
- Increased longevity to be expected
- After initial setting only minimum re-tensioning required over lifetime
- After initial tensioning chain jumping on sprocket teeth eliminated
- Minimum wear on sprocket
- Much higher MTBF & reliability to be expected
- Minimal risk of instantaneous failure
- Lower cost per hectar/acre on the feeder house
- Worry free system
Project phase 1: Development of the belting materials

Developing Silentium Drive started with in-house formulation and specification of the basic belting materials: rubber & heavy fabric.

Their unique properties were especially tailored for the feeder house application by Broekema’s sister company Artemis Kautschuk- und Kunststoff-Technik in Hannover, Germany.

Subsequently Artemis developed proprietary manufacturing technologies for the parabolic traction belting including a specialized endless wrapping & vulcanization process.

Positive test bench results indicated excellent suitability for the feeder house of a combine. The high longevity on the test bench was achieved without re-tensioning of the belting.
Project phase 2: analysis of current feeder house designs & development of conversion kits

To prove the concept in practice, feeder houses from two different German combine manufacturers were partially redesigned and adapted to Silentium Drive for the 2009 and 2010 harvesting season.

Design modifications are minimal and comprised mainly of slight modifications to the frame and its cross members as well as new or modified return drums, new Broekema N-type drive wheels and the new traction belting.

First field test results confirmed the advantages of Silentium Drive and yielded a very smooth and reliable operation.
Project phase 3: broadening the field tests

After the first successful field tests more feeder houses of CLAAS®, John Deere® and New Holland® were acquired and equipped with the Silentium Drive for the 2011 harvest.

These feeder houses are currently being tested by independent contractors worldwide. Their combines are closely monitored in the field.

Technical support by Broekema and constant feed back by the operators insure development completion of Silentium Drive by the end of the year 2011 and beginning of marketing in 2012.
Test results (I)

One of the most noticeable improvements of the Silentium Drive is the noise reduction.

The traditional feeder house equipped with steel chain creates a tremendous noise. This noise is amplified by the box shaped sheet metal construction of a feeder house.

With the Silentium Drive system the source of the noise is eliminated because the slats no longer touch the bottom of the feeder house. No more rattling sounds come from underneath the driver’s cabin.

Silentium Drive proved to be the smoothest and most silent feeder house conveying system so far.

After 1400 ha in grain & corn all physical properties of the rubber traction belting like tensile & delamination strength as well as elongation & pitch accuracy were still within the original tolerance (as of August 2011).
Test results (II)

The tension of the chain is one of the most critical parameters of a feeder house. It is also a source of frustration for many users. For this reason, over time, a broad variety of tensioning systems have been designed and patented for steel chain conveyors.

Because a steel roller chain isn’t elastic and the pivot point of the return drum isn’t in the same axis as the drive shaft there’s always a bit of chain slack even with all these ingenious tensioning designs.

The Silentium Drive system uses a customized reinforced rubber traction belting that - compared to steel roller chain strands - is much more lively, resilient and holds tension in itself.

Therefore, Silentium Drive belts always keep a certain level of inherent tension. Little or no re-tensioning is needed. The slack is minimized which is also beneficial for the product flow. Premature threshing, grain damage, plugging in the feeder house and instantaneous chain failure are prevented.

In case of unfavorable picking up of large foreign objects, this has a by far less damaging effect thanks to the flexibility of Silent Drive.
Users expectations & comments

Comments from blogs & YouTube on Silentium Drive:

Stew Hughes (Australia): “You ripper! What a great idea. I would be very interested in one for my new 740.”

Kent Slyck (IL, USA): “Very interesting new style feederhouse belts.”

Shawn D. Esterl (KS, USA) “It looks like you have developed a very fine product.”

Harold (Germany): “Great system, next year on the Lexion again either as prototype or as retail.”
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