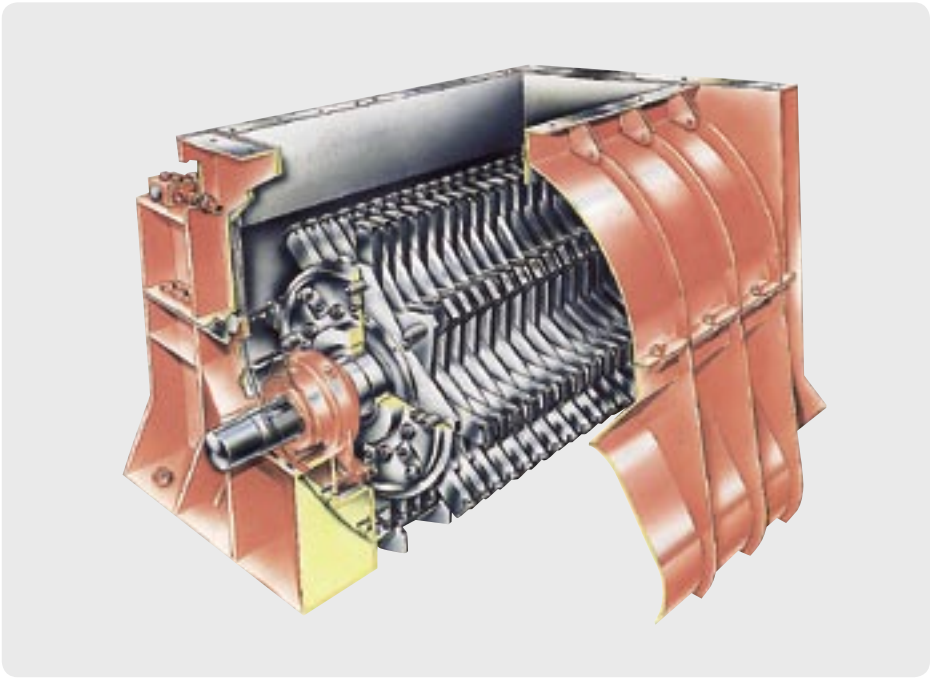
Customer reference case

Farm and forestry

CARB



The Tongaat cane shredder

Sweet success for CARB® in the sugar industry

The sugar cane industry is important to the South African economy, with an annual output from 16 plants of approximately 2,4 million tonnes. A large producer, Tongaat-Hulett Sugar's Darnall Mill, has installed toroidal roller bearings in its cane knife and shredder.

A cane knife set consists of a rotor where the working units are rotating blades (knives). The cane is cut to shorter lengths against the stationary carrier slats.

A shredder completes the cane preparation work begun by the knife set. It consists of a rotor, carrying rectangular bars (hammers) which pivot on discs. The ends of the hammers pass very close to an anvil plate (washboard) which occupies a quadrant of the circular sweep of the hammers. The cane is shredded between the rotating hammers and the stationary anvil plate.

Both machines impose similar operating conditions on the bearings – high speed, heavy impacts and high vibration levels and loads which vary greatly in magnitude and direction. In principle the process is similar to that of the hammer mills and impact crushers used in the rock and mineral processing industries.

Traditionally two spherical roller bearings were used on the rotors. The non-located bearing had to move axially in the housing to accommodate thermal expansion of the shaft. However, the housing fits were necessarily tight in order to limit the creeping of the outer rings because of the imbalance and variable direction loads. This was a major compromise and a weak point of the machines; the bearing rings could not move easily in the axial direction, which produced large axial loads on both bearings during shaft expansion, high operating temperatures and reduced bearing lives

for both bearings. In addition, the fit was not tight enough to prevent creep of the bearing rings and wear in the housing bores, so it was commonly necessary to rework the housings during the off-season.

If CARB toroidal roller bearings are used in the non-locating position then both bearings can have tight fits for both rings, since the axial expansion of the shaft is accommodated within the toroidal roller bearing under very low friction and negligible thrust loads.

After installing CARB in the non-locating position, the operating temperatures of the bearings in the Darnall machines decreased by around 25 °C and both machines are now operating safely without risk of sudden breakdowns.

The arrangement with a spherical roller bearing as locating bearing, in combination with a toroidal roller bearing, is the optimal and compromise-free solution, giving longer bearing service life, improved reliability and reduced maintenance costs.

Operating conditions – shredder

Bearing:	C 3156 K/C3
Bearing housing:	one piece, tight fit
Speed:	960 r/min
Bearing temperature:	53 °C
Radial bearing load:	226 kN estimated
Oil lubrication:	4 l/min of ISO VG 68

Operating conditions – shredder

Bearing:	C 3144 K/C3
Bearing housing:	one piece, tight fit
Speed:	650 r/min
Bearing temperature:	55 °C
Radial bearing load:	142 kN estimated
Grease lubrication:	LGEP 2 190 mm^2/s at 40 °C

SKF and CARB are registered trademarks of the SKF Group.

© SKF 2006
The contents of this publication are the copyright of the publisher and may not be reproduced (even extracts) unless permission is granted. Every care has been taken to ensure the accuracy of the information contained in this publication but no liability can be accepted for any loss or damage whether direct, indirect or consequential arising out of the use of the information contained herein.

Publication **4772 EN**