

DRIVE TECHNOLOGY

**Synchro Products
and Synchro Systems
for manual
Transmissions**

»SMOOTH AND EASY SHIFTING«
INNOVATIVE SYNCHRO TECHNOLOGY
FOR STATE OF THE ART TRANSMISSIONS



HOERBIGER

THE DRIVE TECHNOLOGY DIVISION - WORKING WITH THE VEHICLE INDUSTRY AROUND THE WORLD

The HOERBIGER Group's history begins in 1895. Today it is a worldwide enterprise with more than 3000 employees. Since 1956 HOERBIGER's forceful innovation, flexibility and reliability have made it the preferred choice of the automotive and heavy-duty vehicle industries.

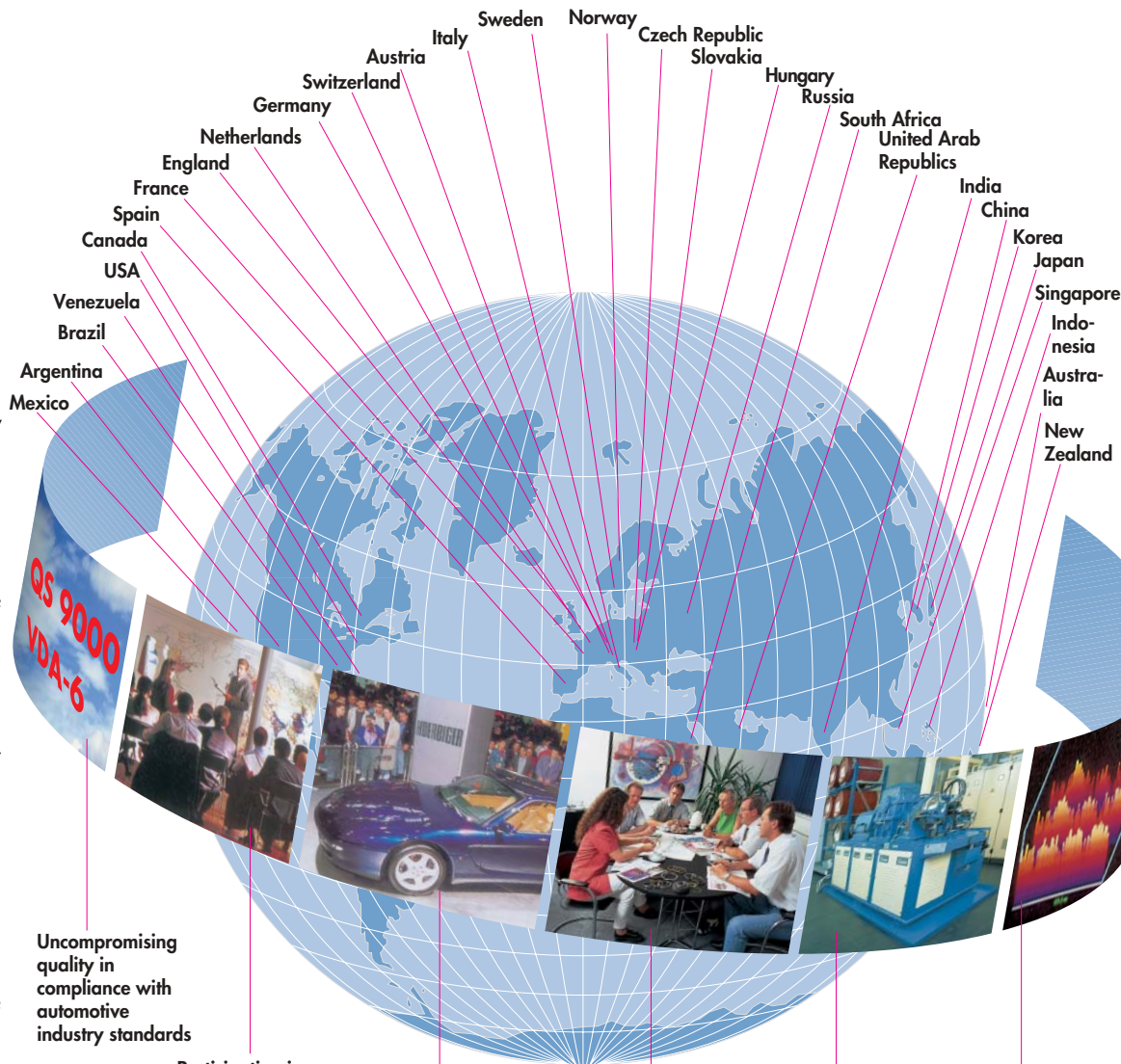
A SECURE BASIS FOR INNOVATION AND PROGRESS

With more than 60 companies and operation sites in 30 countries, HOERBIGER is active around the world in three strategic business units.

- Compression Technology
- Automation Technology
- Drive Technology

In Drive Technology, our wide circle of customers in the automotive, heavy-duty vehicle and transmission industries makes us Europe's leading producer of friction components and systems. Our metallic and organic friction linings have been proved their worth in clutches, power shift transmissions, axles, brakes and synchronizers.

Such strengths constitute a secure basis for our innovative friction technology optimized systems.



Uncompromising quality in compliance with automotive industry standards

Participation in professional seminars: an essential aspect of our total systems approach

Trade fairs: an international forum for customer contacts, reflection of new trends and latest developments. HOERBIGER Drive Technology is present worldwide.

Joint ventures: to promote the synergy of specialist skills in the development of future-orientated systems.

The test bench: fast motion simulation of years of vehicle tests

Innovative Products require state of the art testing methods

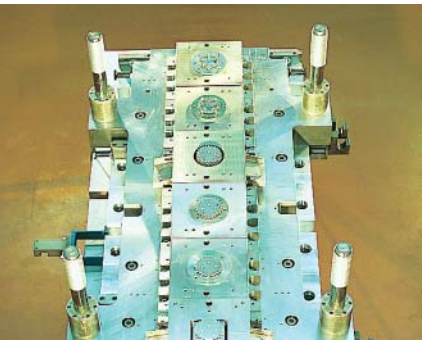
... Competence Center Synchronizer Systems



Research and development: recent advances and customer-specific projects are thoroughly tested before going into production.



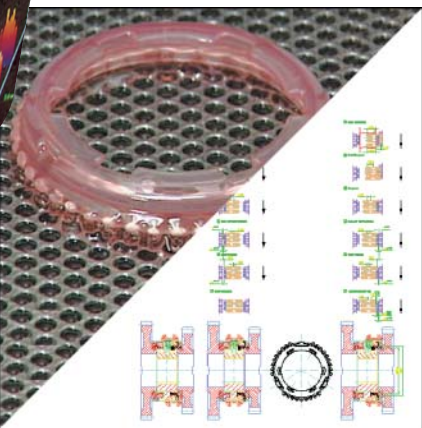
The latest manufacturing equipment ensures economic production at consistent high quality.



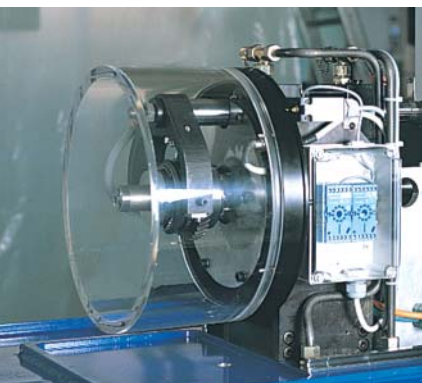
The worldwide exclusive forming process: performance and economy intimately combined.



Engineering in detail - cost-effective solutions for every transmission design. The modular structure lends itself to wide usage and easy upgrading.



Finite elements
- a method of revealing stress in the drive lug of a dual cone friction ring,
- rapid prototyping
- tolerance analysis for design optimization.



Cooperative ventures: Mutual support are revealed in new projects that have high goals. One example: HOERBIGER's μ -comp universal test bench developed in collaboration with the Hannover School of Technology's Institute for Mechanical Components, Design and Tribology.

Product application

OPTIMUM PERFORMANCE
FOR AUTOMOTIVE
MATCHED TO SPEED

In Europe HOERBIGER plays a major role with its innovative products. New materials, new forming processes and new synchronous transmission configuration, are all beneficial to the customer.

HOERBIGER DRIVE TECHNOLOGY FOCUSES ON STRENGTH

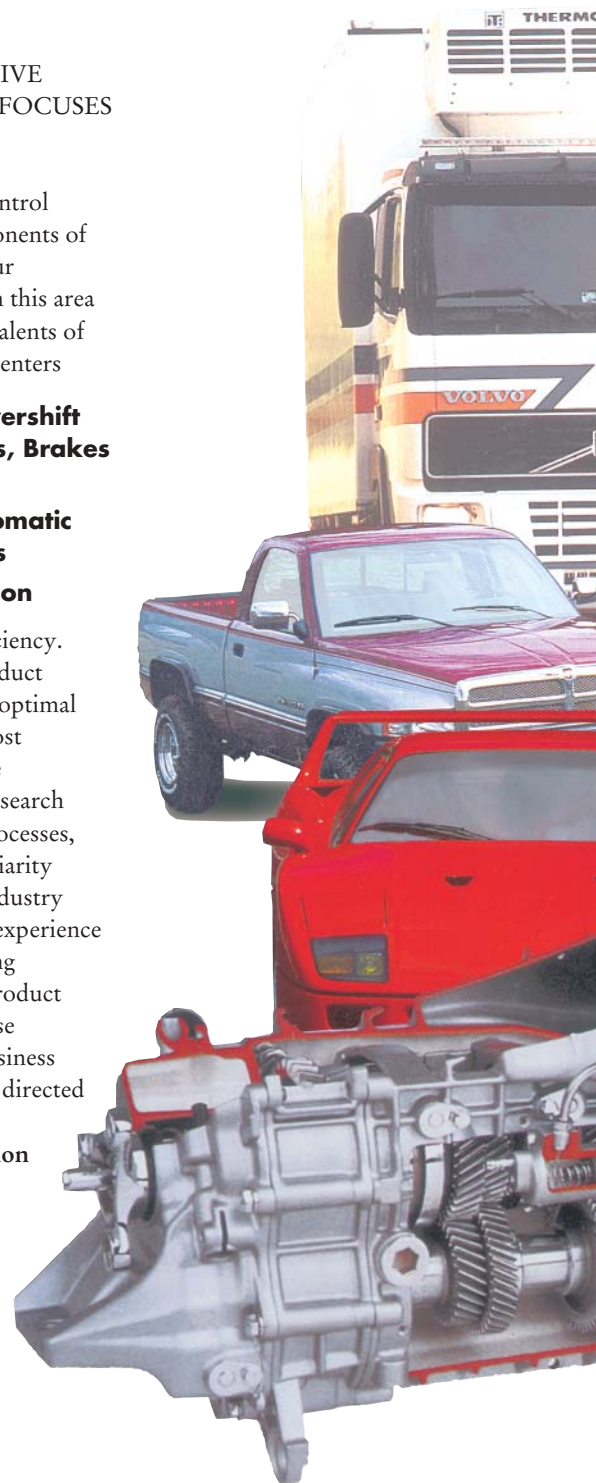
»Perfect friction control through key components of the drive train«. Our accomplishments in this area and the combined talents of our three product centers

■ **Discs for Powershift Transmissions, Brakes and Axles**

■ **Discs for Automatic Transmissions**

■ **Synchronization**

guarantee high efficiency. In the Synchro Product Center, this means optimal performance and cost reduction are in the foreground. Our research into tribological processes, our thorough familiarity with automotive industry specifications, our experience in the manufacturing technology of all product sectors and our close collaboration in business and research are all directed at the same target - **customer satisfaction in every respect.**

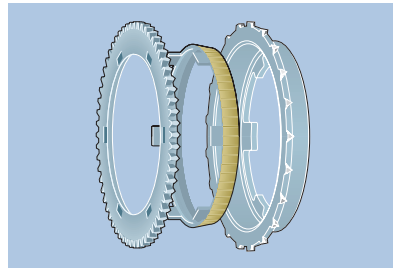


PERFORMANCE SYNCHRONIZATION FOR PASSENGER AND COMMERCIAL VEHICLES, SPECIFIC TRANSMISSION REQUIREMENTS

Innovations in synchronization.
Systems applications for any
customer.

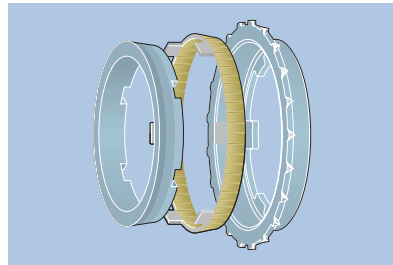


ALTERNATIVE CONCEPTS FOR THE SMOOTHEST GEAR SHIFTING POSSIBLE



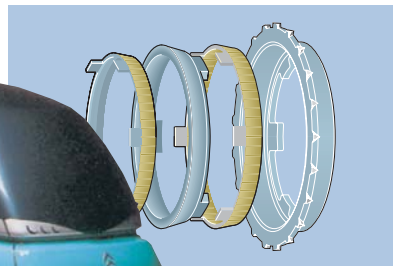
Single cone system

- Brass + foil
- Drawn component with friction lining
- Formed components
- Modular system



Dual cone system

- Dual cones + annular spring
- Formed components
- Optimized PM solution



Triple cone system

- High capacity output from consistent exploitation of the modular system



... and the total system hardware, a sign of
HOERBIGER's first-class system engineering ability.

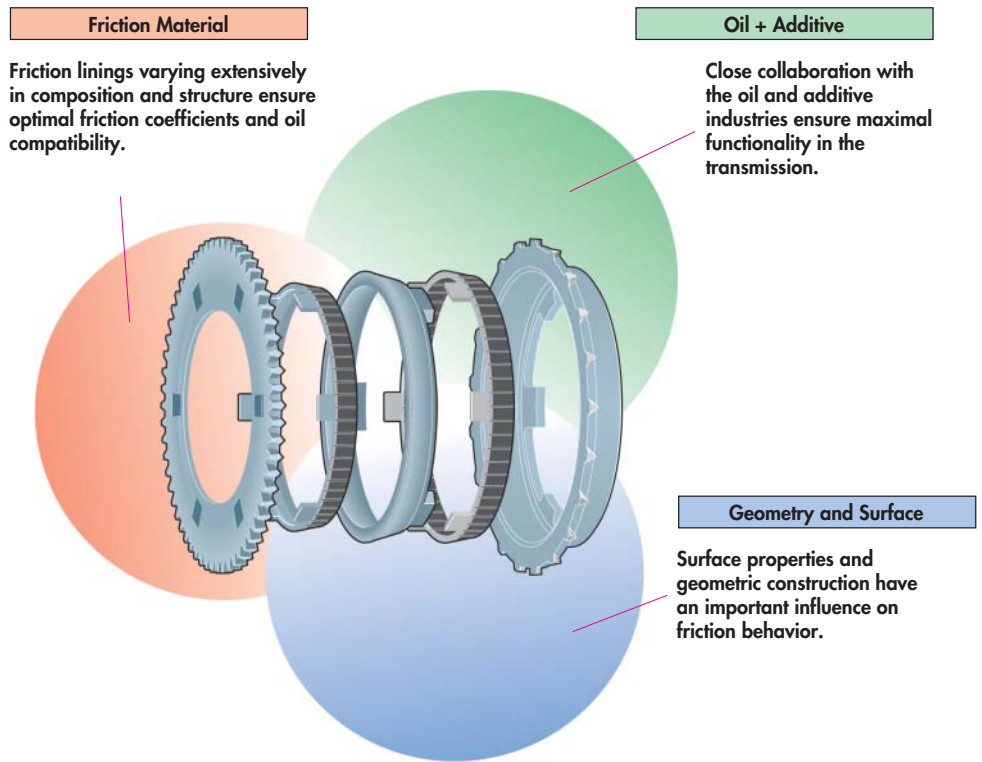
HIGH-PERFORMANCE SYNCHRONIZATION BELOW ALL PRICE STANDARDS

With the background of modern lifetime oils and corresponding additives, the demand for smooth shifting, higher performance, longer life and less friction loss, harmonizes with the demand for synchronization.

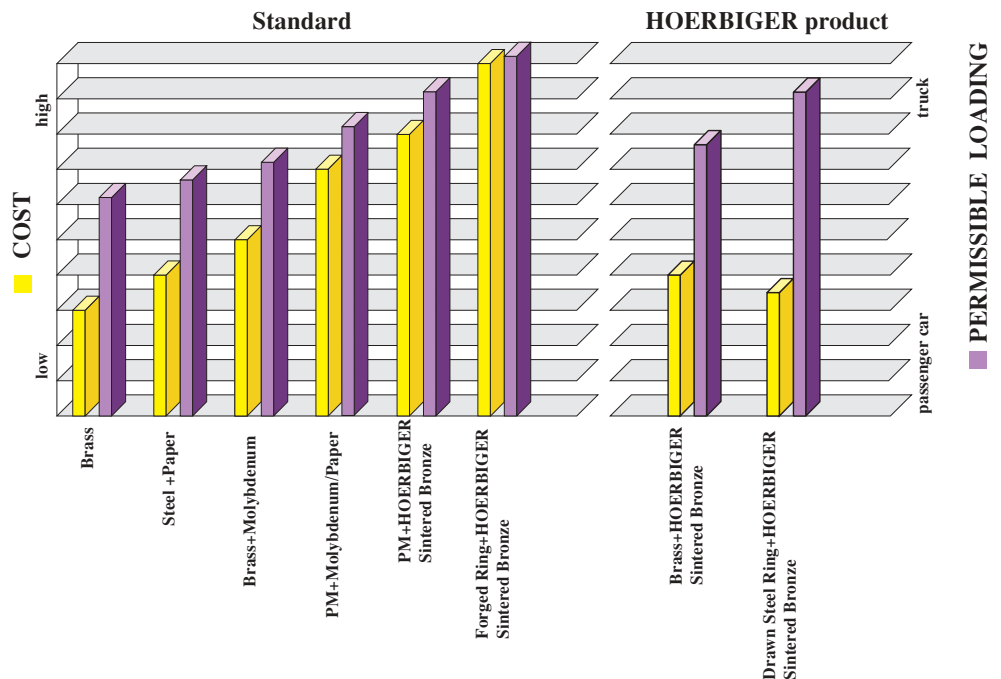
HOERBIGER SYNCHRO: OPTIMAL PERFORMANCE AT REDUCED COST

In addition to our proven and widely distributed sintered friction linings, the non-metallic nature of HOERBIGER's newly developed carbon linings provides a new potential for friction control and oil compatibility. Bench testing and vehicle trials, document superior operating parameters over a wide range of loads and spectrum of oils.

Our extraordinary economical method of forming flat rings directly into the cone is also being employed to produce HOERBIGER's »Carbomet« linings. The modular approach also offers the ability to use different lining foils with different core materials, allowing maximal flexibility and economy.



Comparison of Cost and Performance



ALFA ROMEO
 BMW
 CATTINI
 DAEWOO
 DAIMLER BENZ
 FERRARI
 FIAT
 FORD
 GENERAL MOTORS
 GETRAG
 GRAZIANO

**INNOVATION
 AND PROGRESS**

**...thank
 our customers**

HYUNDAI
 KIA
 MITSUBISHI
 NEW VENTURE GEAR
 OPEL
 PORSCHE
 RENAULT
 SSANG YONG
 TOYOTA
 VOLVO
 ZF

SYNCHRO SYSTEM PRODUCT CENTER IN PEITING



ADVANCED
 ENGINEERING OPENS
 NEW PERSPECTIVES

Excellence in synchro technology means possessing extensive skills in the drive-line area and especially in tribology. Through its collaboration with customers in development, our advanced solutions demonstrate a high level of engineering capability. Daily experience with automotive and transmissions technology, specialized knowledge of metallurgy and forming, and first class knowledge of tribological processes combine with our customers' own knowledge creating »new and advanced solutions for the future.«



HOERBIGER

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