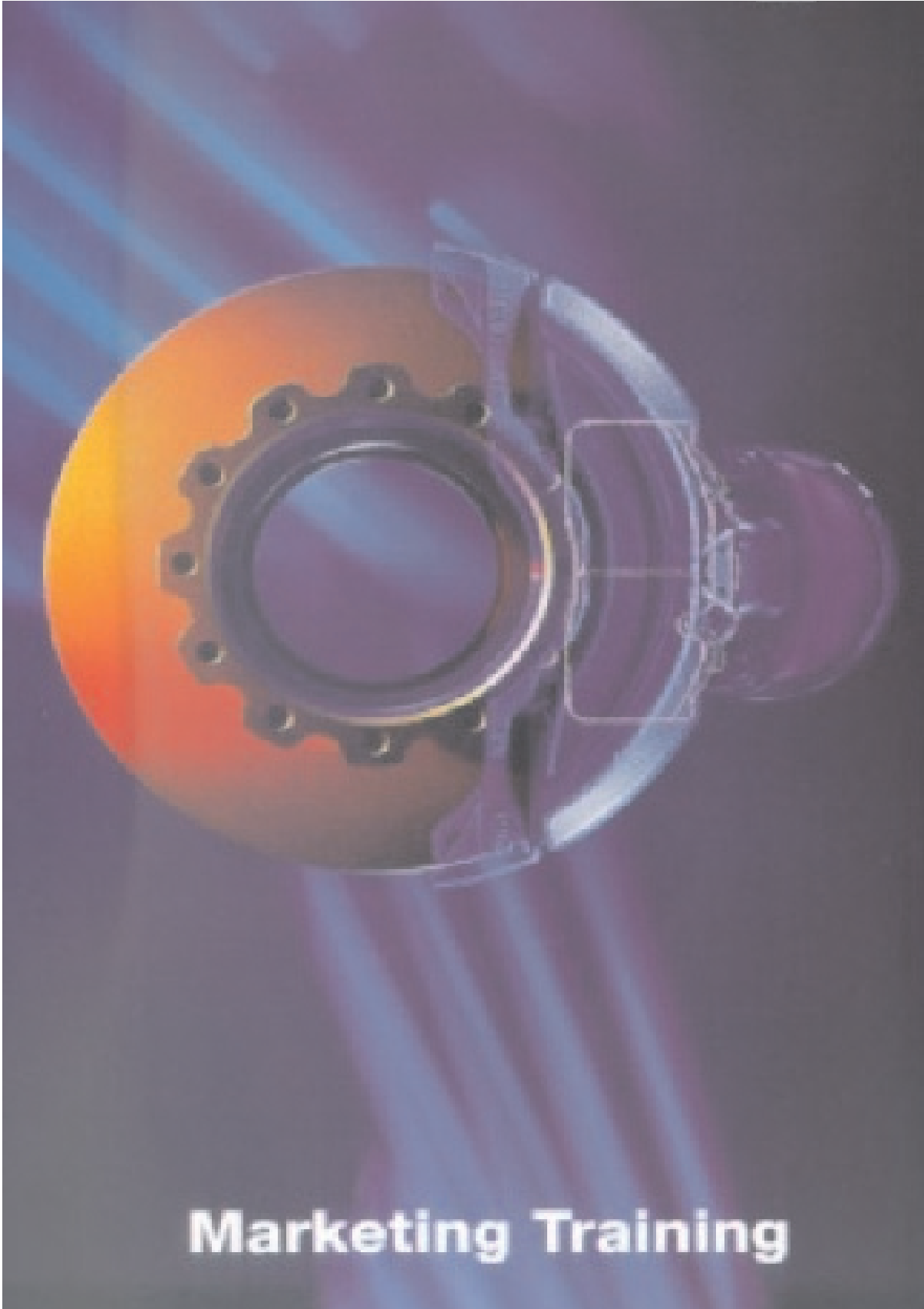




# MAN Disk Brakes

## Dependable Technology



**Marketing Training**

## Why disk brakes in a truck or bus that travels in excess of 65 mph?

Improved road handling, higher engine ratings and torque, reduced drag and rolling resistance resulting in faster acceleration and higher average speeds

Higher vehicle speeds with full loads

Higher traffic density, greater chances of emergency braking

Extremely high kinetic energy needed to brake on wet roads, high front axle loads effecting vehicle directional stability

The power and behavior of drum brakes cannot be improved

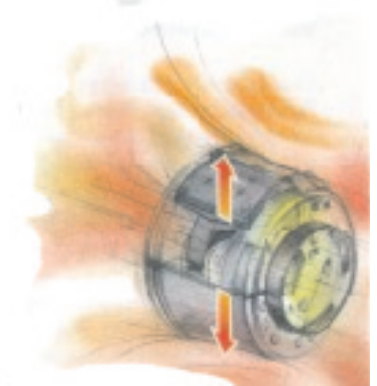
**Disk brakes provide optimum braking while retaining directional stability.**

## Why are disk brakes more efficient?

Flat brake disk (axial brake) under high pressure versus round brake drum (radial brake) during braking

Full friction surface of the brake pad on the plane brake disk

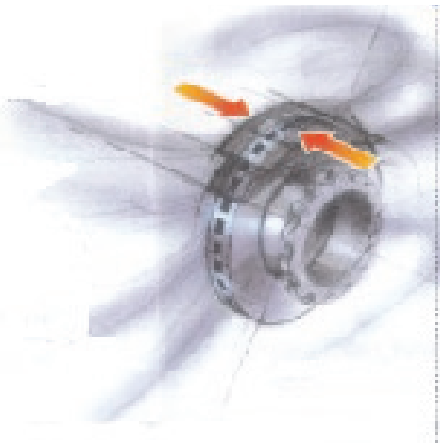
No loss of brake power due to overheating or partial contact from brake drum parts expansion



Higher residual brake force after repeated braking

Brake disks can withstand extremely high temperatures

Full contact of brake pads achieve maximum effect



No vitrification of brake pads. Dangerous fading or slipping is almost completely eliminated

**Disk brakes can withstand higher loads and its efficiency is maintained considerably longer even under the highest stresses**

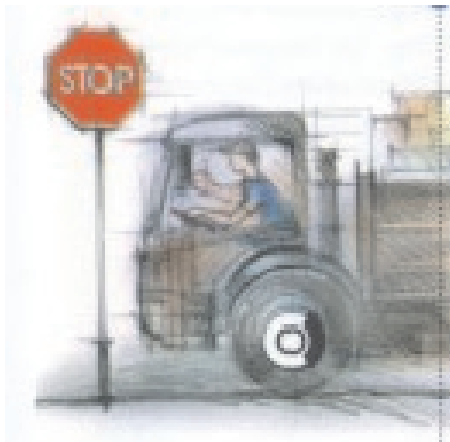
## Why do disk brakes have better braking behavior?

Disk brake axial arrangement permits a simple and compact design

Linear characteristics lead to an even progression of brake force

Basic design principle makes for higher efficiency

Low hysteresis is particularly suitable to ABS control cycles



Sensitive brake application and better brake feeling

Uniform braking from small fluctuations in brake forces

Retardation values retained even under heavy stresses

Minimal “pulling to one side” due to uneven brake forces

**Driver friendly braking behavior. Sensitive braking in all situations and better braking feeling**

## Why are disk brakes more economical?

Optimized installation space in the wheel rim resulting in the largest possible brake disks and pads

Optimized cooling resulting from open sliding caliper design with internally ventilated brake disk

Even and safe brake pad wear resulting from simple pad guide with level braking faces



Long service life of disk and pads versus drum brakes

Shorter service downtime due to quick pad changes

Good access for visual brake component checks

Maintenance free brake components

**Clear economic benefits due to long service life and reduced maintenance downtime**

## Why do disk brakes have higher safety reserves?

Minimal braking effect from high temperatures and extreme driving requirements

Minimal heat fading

No brake disk distortion from extreme heat due to internal ventilation



High power and safety reserves for emergencies

Constant braking power under high stresses

Shortened braking distance under emergency braking with considerably improved directional stability

**The decisive safety aspects of the disk brake design are shorter braking distances with directional stability and large power reserves under high stress**

## From the test bed to series production...



The individual components are subjected to extensive tests on the test bed. The optimum arrangement of components on the axle beam, operational reliability and convincing performance are requirements that must be met prior to series production.



The brake disks are subjected to the highest stresses from contact pressure. The broad brake disks with radial cavities made of heat resistant special gray cast iron, are still operational at temperatures in excess of 1380 degrees F.



Brake performance is tested on the test track and in racing to ensure their practice. Only after these extensive tests can the disk brake be cleared for production.



Today, all MAN city, inter-city buses and coaches utilize the MAN disk brake system on all wheels with ABS. The disk brake system is used with and without retarders.

## Disk Brakes in detail...

MAN trucks and buses are equipped with air actuated sliding caliper disk brakes

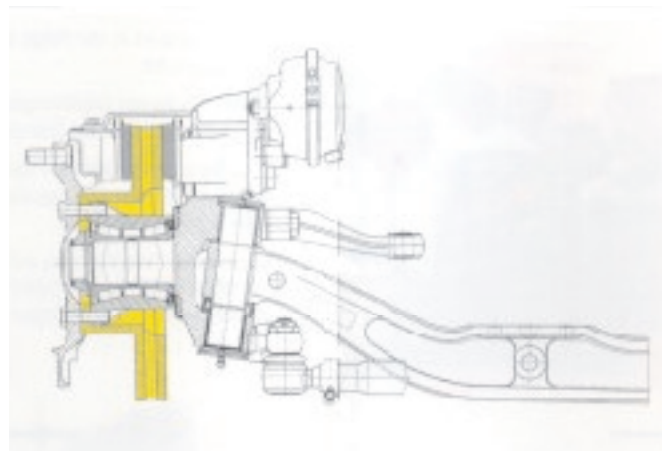
The high contact forces are transmitted mechanically via needle mounted actuating device

Depending on size the actuating pressure is transmitted evenly to the brake pads via one or two plungers

The easy action, fully sealed guides between the axially moving sliding caliper and fixed brake anchor plate are maintenance free

Integrated automatic adjustment with wear display

There are no brake shafts, external levers or cylinder brackets, as the brake cylinders are directly attached



## Disk Brakes in detail...

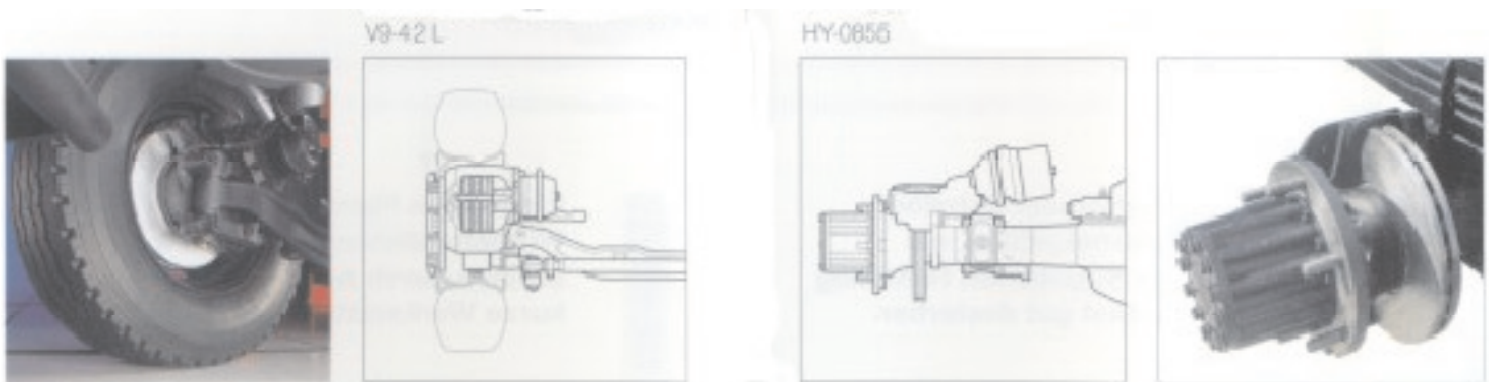
The high efficiency of 95% is achieved by only a few moving parts and low friction bearings

Asbestos free brake pads 19 to 23 mm thick, depending on version

Extremely heat resistant brake disks (34 to 45 mm) made of special gray cast iron with internal ventilation

The brake disks are 330 to 432 mm in diameter and permissible wear of 6 to 10 mm allowed, depending on version

The service and parking brakes use the same actuating unit and differ only in the shape of the brake cylinder

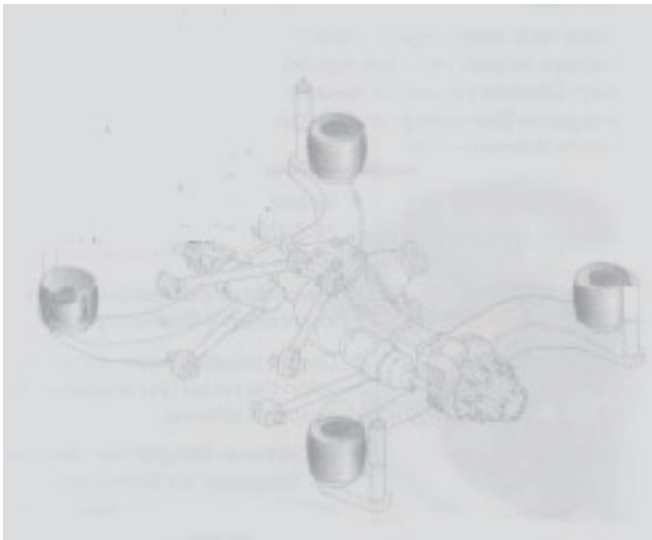


## Disk Brakes in practice...

All friction brakes (drum and disk) have wear parts and are unsuitable for continuous braking, i.e. on long downhill runs.

Disk brakes are no substitute for an engine brake or retarder. Economic driving with sensible use of the engine brake or retarder optimizes the service life of pads and disks that are equal to those in comparable drum brakes.

**NOW IT IS UP TO THE DRIVER!**



Economic use of technology means driving and braking with anticipation and economic thinking. Disk brakes offer safety in any situation.



## Maintenance and Brake Pad Replacement...



Basically, MAN trucks and buses equipped with disk brakes are maintenance free

The disk brakes automatically cleans itself by wiping off the effects from disk brake pad residues and outside dirt

Removable components during disk brake pad replacement:

Safety Clip

Pressure plate with tension clip

Disk brake pads with tension clip

The small amount of removable parts makes it possible for quick replacement of disk pads with little effort, no special tools or devices