



Headquarters/Germany

Christian Pfeiffer
Maschinenfabrik GmbH
Sudhoferweg 110-112
59269 Beckum
Germany
Tel. +49 (0) 25 21/849-00
Fax +49 (0) 25 21/849-123
office@christianpfeiffer.de
www.christianpfeiffer.de

Italy

Christian Pfeiffer
Mezzomerico SpA
Via Marano Ticino 7
28040 Mezzomerico (NO)
Italy
Tel. +39 (0321) 923010
Fax +39 (0321) 923141
info@christianpfeiffer.it
www.christianpfeiffer.it

USA

American Pfeiffer Corporation
3407 West Chester Pike
Newtown Square, PA 19073-4227
USA
Tel. +1 (610) 3566995
Fax +1 (610) 3568987
cpb@americanpfeiffer.com
www.americanpfeiffer.com



Foundry/Austria

Christian Pfeiffer
Maschinenfabrik GmbH
Werkstraße 5
8940 Liezen
Austria
Tel. +43 (0)3612/270-0
Fax +43 (0)3612/270-589
office@cpb.at
www.christianpfeiffer.de

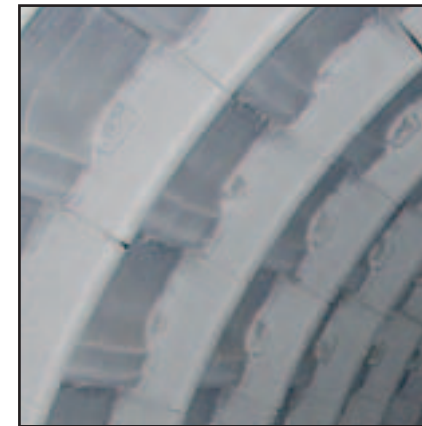
South America

Christian Pfeiffer
Latinoamericana S.A.
Parque Industrial Liviano
Av. Brasil Calle # 1
Santa Cruz, Bolivia
Tel. +591 (3) 3481768
Fax +591 (3) 3492597
christianpfeiffer@unete.com
www.christianpfeiffer.de

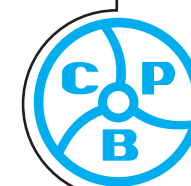


Christian Pfeiffer
Systems and components

Mill shell lining



Konzept und Gestaltung Kuhlms & Halbur/CPR Lippstadt - D.Vo./2,1-00-engl./2,04



Christian Pfeiffer
Systems and components

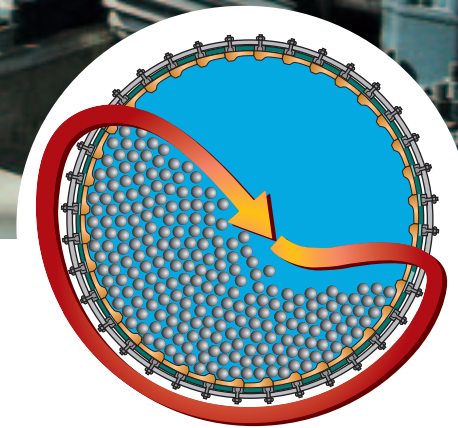
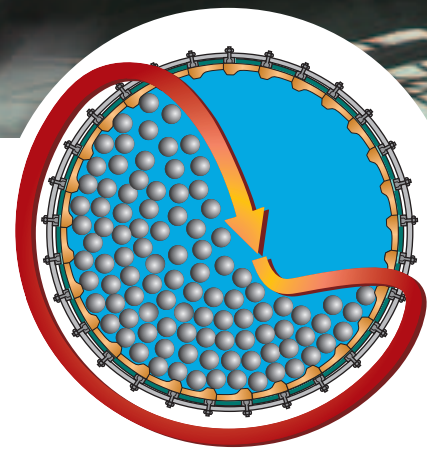
High energy input for the comminution process

Cement, which is used as a basis for numerous construction activities, is an attractive raw material that can be manufactured almost uniformly through-out the world.

Although the extraction of raw materials – limestone, clay and aggregates – is still relatively simple and inexpensive, the various stages of production in the cement works require a high-energy input. Particularly in the various grinding processes – the generation of raw meal prior to the burning process and grinding of the cement clinker – requires around 20 million kWh power consumption per year for a medium-sized production line. This amounts to around 60 % of the energy input of a production line.

The grinding process usually takes place in ball or tube mills which, due to their simple principle, are widespread throughout the world and require only low maintenance efforts.

The rotary movement of the mill shell causes the grinding media (cast steel balls) to rise, fall or roll onto the material to be ground with high impact or pressure energy and thus performs the comminution.



Mill

Mill shell lining

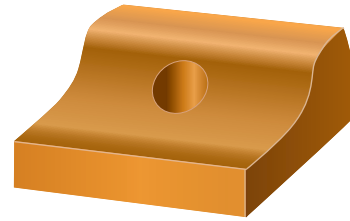
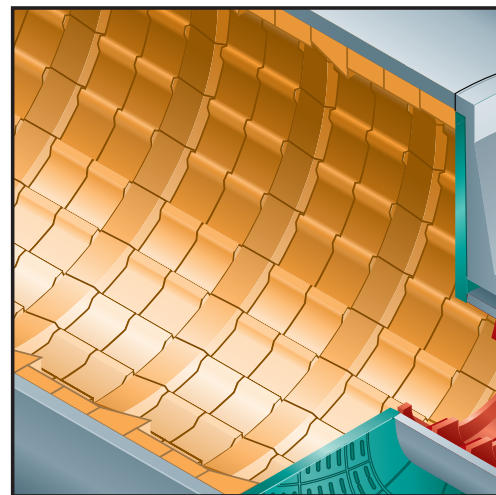
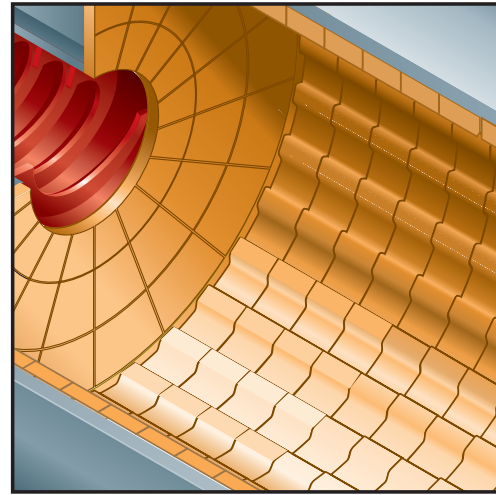
Lining systems for tube mills

Tube or ball mills are horizontal shells in which charged balls of varying sizes "smash" the material passing through by impact energy.

The mill shell is fitted with an inner lining to protect the mill cylinder: A lining consisting of highly wear resistant sectional plates serves as protection against wear.

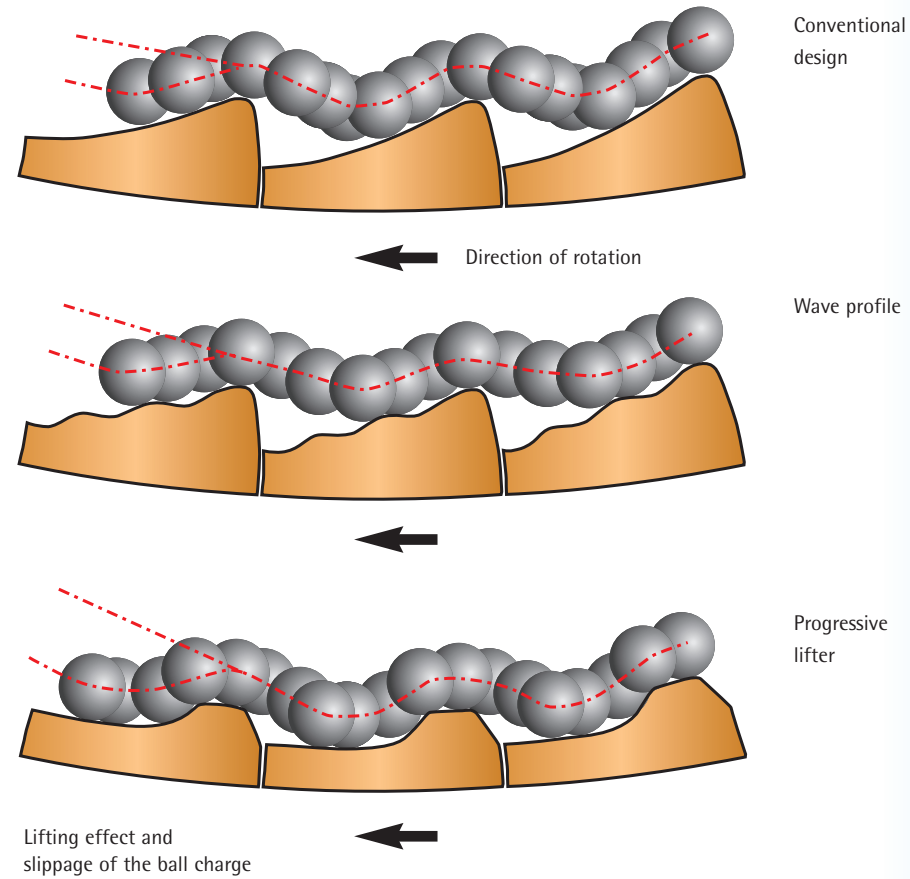
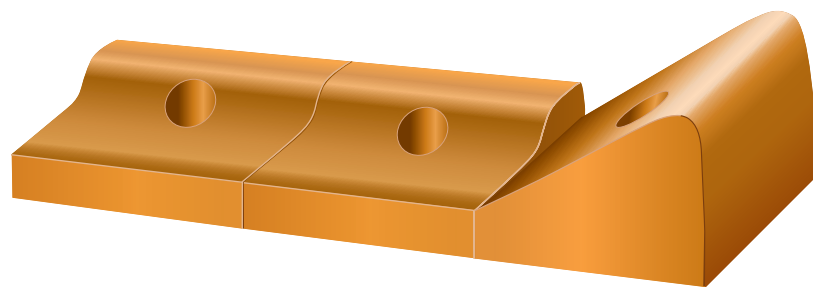
Besides the protection of the mill diaphragm, the lining also has the task of improving the lifting and flow of the balls due to the particular shape of the individual plates.

Different heights and the layout of the individual wear plates ensure the correct distribution of the trail of balls and reduce the relative movement between the balls and the lining.



Modified shape improves the efficiency of the mill

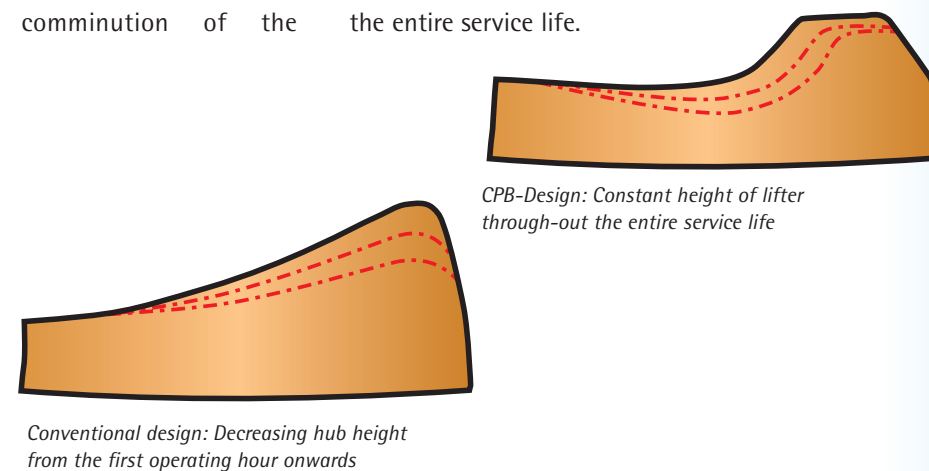
Christian Pfeiffer is not only the manufacturer of the lining systems, but also applies to the procedural flows in the grinding unit. Our know-how puts us in a position to positively influence the grinding process due to the modified shape of the segments and thus improve the efficiency of a grinding system while minimising wear.



Consistent grinding efficiency throughout the operation

In comprehensive test series, CPB has optimised the shaping of the progressive lifter to such an extent that the ball charge ensures optimum comminution of the

material to be ground. The shape of the lifter is retained through-out its service life; therefore the grinding efficiency remains consistent during the entire service life.



Safe and simple: Ball mills

Every year around 1.4 billion tons of cement clinker are ground, 90 % of which is ground in ball mills. This size reduction process requires approx. 8 % of the entire world's energy requirement.

The principle of the ball mill is simple; reliability and availability of the systems guarantee high operating reliability. Ball mills have proven their worth in nearly all cement production lines of the world.

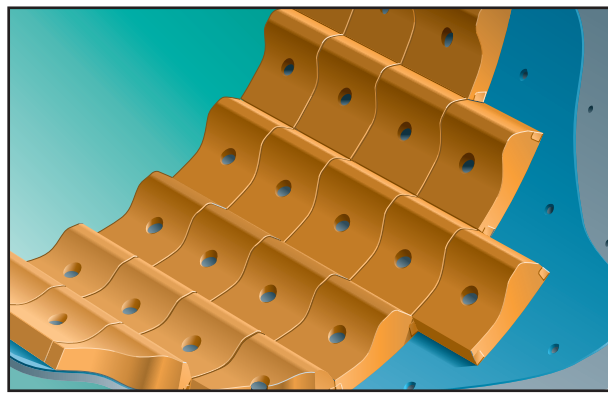


Mill shell lining

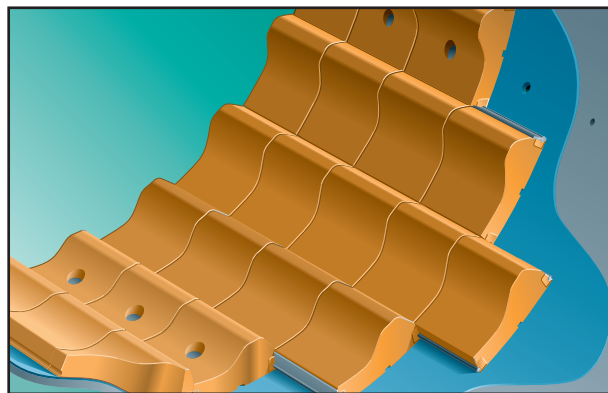
Fastening systems

As a specialist in linings for ball mills, CPB can offer any fastening system required. All linings are tailor made to the requirements of your mill.

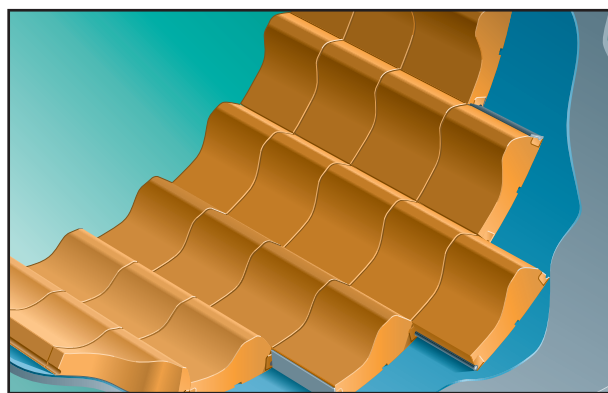
The fastening systems described below are standard:



A **bolted fastening** requires a drill hole in the mill cylinder for each plate. The system is easy to operate and can be installed without the assistance of CPB specialists.

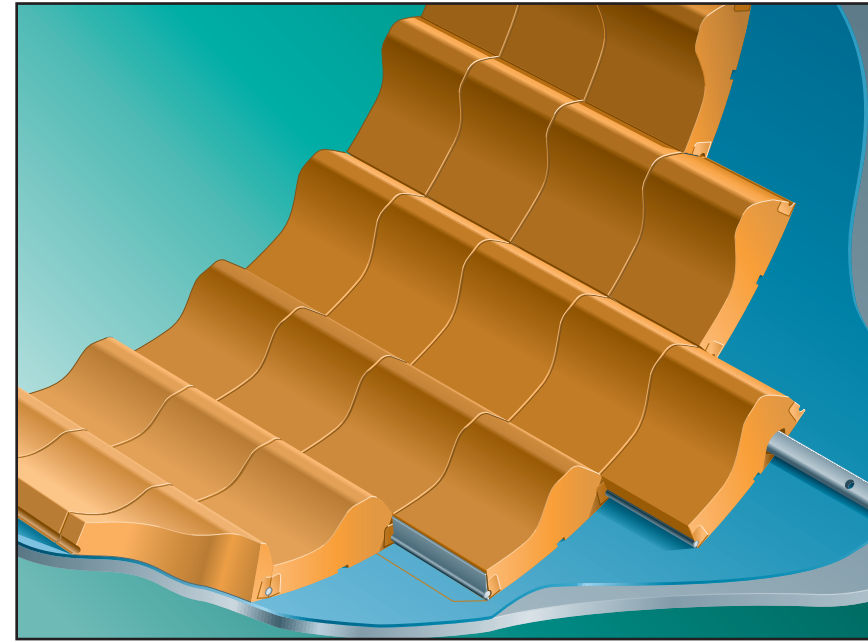


With a **semi-bolted** fastening option, at least two rows of plates are bolted. Special tools are needed for installation; in this case it is recommended to have CPB staff to supervise the installation of the system.



With the **boltless** option, lining plates are forced-fitted with positive locking without any bolts. Installation calls for precise preparation and should only be carried out with assistance from CPB specialists.

Compact

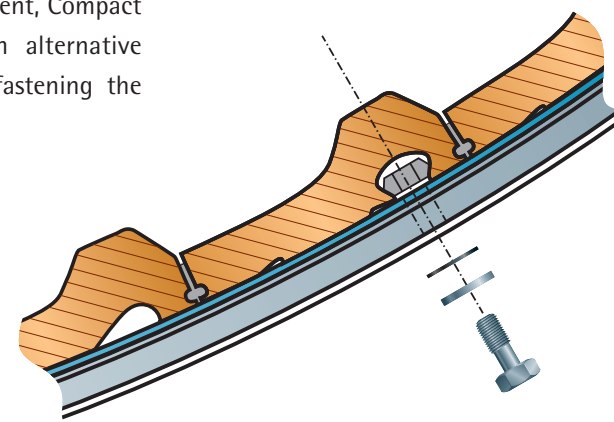


Boltless fastening systems also include the system developed by CPB that is known as Compact Lining. The lining plates are held on a guide rail that is bolted to the mill cylinder.

Particularly where the position of the drilled holes of the mill cylinder are inconsistent, Compact Lining is an alternative option for fastening the

lining plates. It enables standard format plates (DIN dimension) to be used and thus increases the cost-effectiveness of the mill.

Compact lining has proven its worth in practice and is being used in an increasing number of mills.



Lining plates for all mill systems

The lining of the mill cylinder is subject to a high level of abrasion under the harsh conditions of everyday operation.



We have developed a number of proprietary enhancements, in particular for semi-bolted fastening, as it unites the most advantages in everyday operation:

- high degree of installation safety,
- quick replacement of plates,
- short down-time during overhaul.

Systems

Lining

Stages of

Stages of production

CPB linings are used successfully through-out the world

With know-how based on many years of experience in grinding technology, our designers are constantly working on the further development and improvement of mill linings. To date, more than 2000 mills throughout the world have been fitted with our lining systems.



Precise plates thanks to a unique casting process

At CPB, the lining systems are made from cast steel. Depending on the particular application

of the plate, different materials containing up to 26 % chrome are used.

At CPB, the plates are cast using the shell mould casting procedure. This casting method is ideal through-out the world for manufacturing wear resistant systems for tube mills. It allows adherence to very small manufacturing tolerances and supplies precise, dimensionally stable cast material products.

Qualified toolmakers and mould designers produce precise models from steel and thus create the basis for the mass production of the castings.



CNC processing centre for model construction



Secure data for investment decisions



Christian Pfeiffer will always provide you with secure output data for your investment decisions since we determine all necessary parameters for the successful operation of your grinding system in semi-industrial tests.

In addition, our Research and Development team applies itself to the new and further improvement of machines, components and procedures. The extent of our experts' success in this field has already often been proven over the past few decades, and the results of their efforts have often become milestones in the development of modern grinding systems.

Quality as a requirement for international success

To meet the requirements of our international customers, our quality assurance system has been certified since 1994.

We constantly monitor and log all stages of production, from the material charge through manufacture to dispatch of the goods.



production

Successful start after overhaul of mill

When the new lining system has been installed, the mill must be optimised. Optimisation is carried out step-by-step in accordance with the recommendations of our specialists.

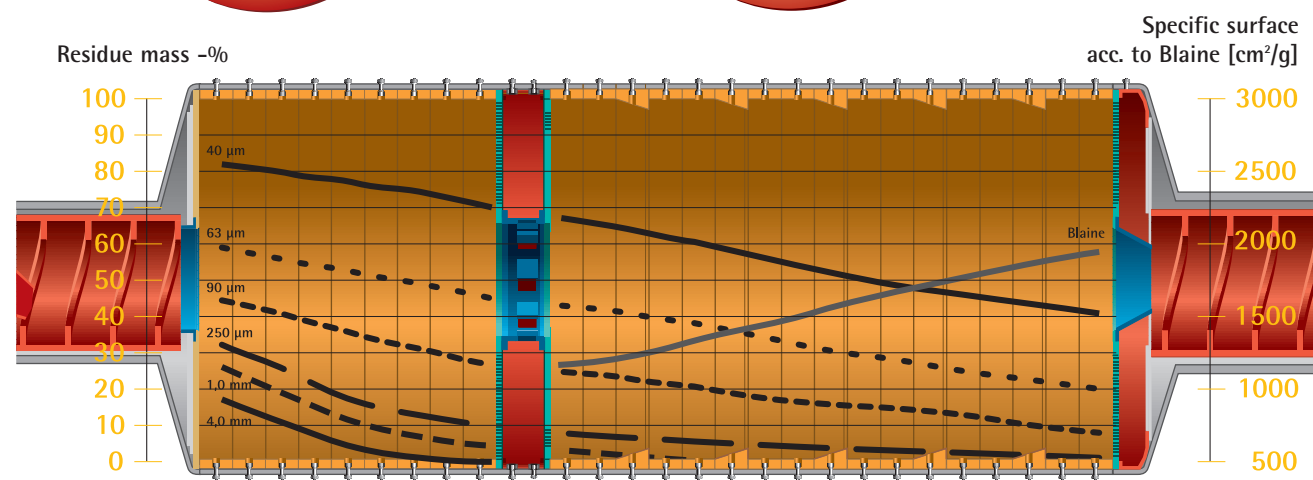
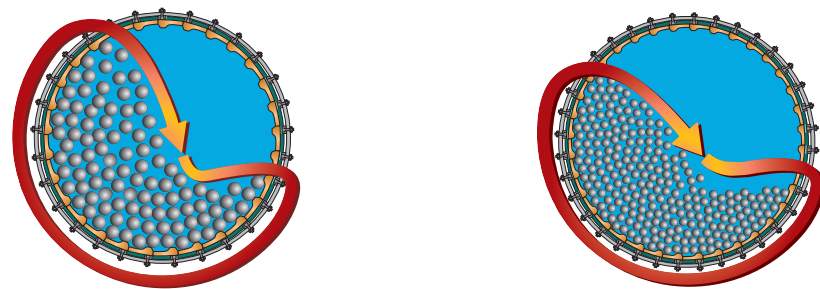
The mill is first charged with 80 % of the calculated grinding media and

continually operated with material. To examine the grinding progress, the mill is subjected to an emergency shutdown and sample of materials are taken from along the mill axis. A grinding diagram can now be created on the basis of the particle size distribution analysis.

The mill is then filled with grinding media up to the optimum operating charge for the normal operation of the mill.

For optimisation it is also necessary to consider the influencing parameters of the entire grinding system.

Systematic evaluations and many years of practical experience on the part of our engineers guarantee that every mill can be adjusted to meet customer requirements.



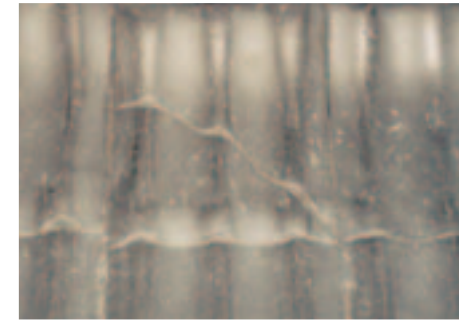
Distribution of particle size by fractions

Replacement

Quick availability in the event of a plate breakage

Metal in the feed material, operation of the mill without material feed or with insufficient material may result in plate breakage.

With the semi-bolted or boltless fastening options, breaks may result in failure of the lining system, for this reason this damage must be repaired immediately.



To avoid long downtimes, we have developed a special repair kit. With the use of this kit, individual damaged plates can be replaced without difficulty.

The Christian Pfeiffer installation team or the company's own maintenance engineers can replace the plates.



We have many advantages to offer in addition to our products

One advantage is our comprehensive service.



From individual recommendations, detailed planning, up to reliable installations. Even afterwards, we are there for you if questions arise, or if you require anything, and naturally for maintenance and inspection.

If you would like to have more information about our products and services. Call us. It will be a pleasure for us to assist you.