

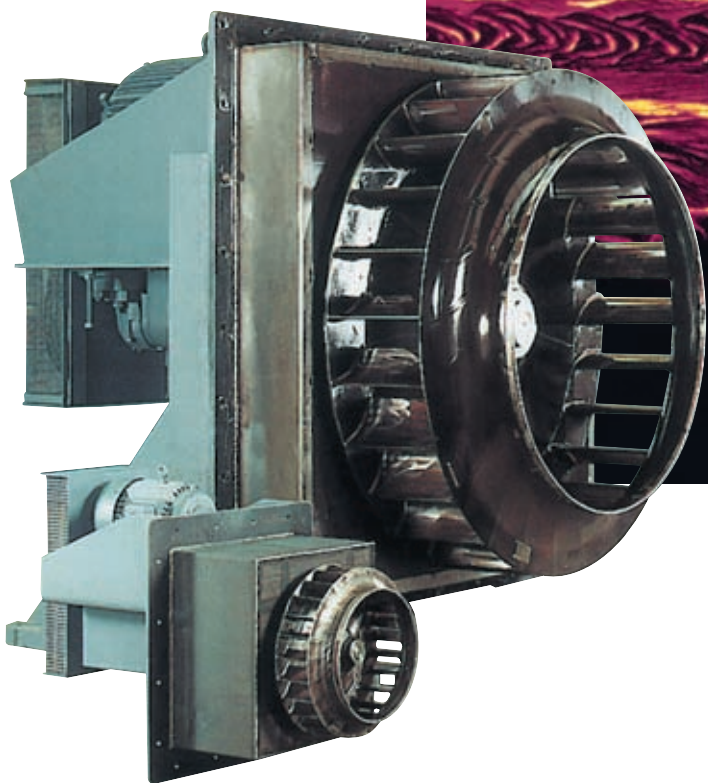
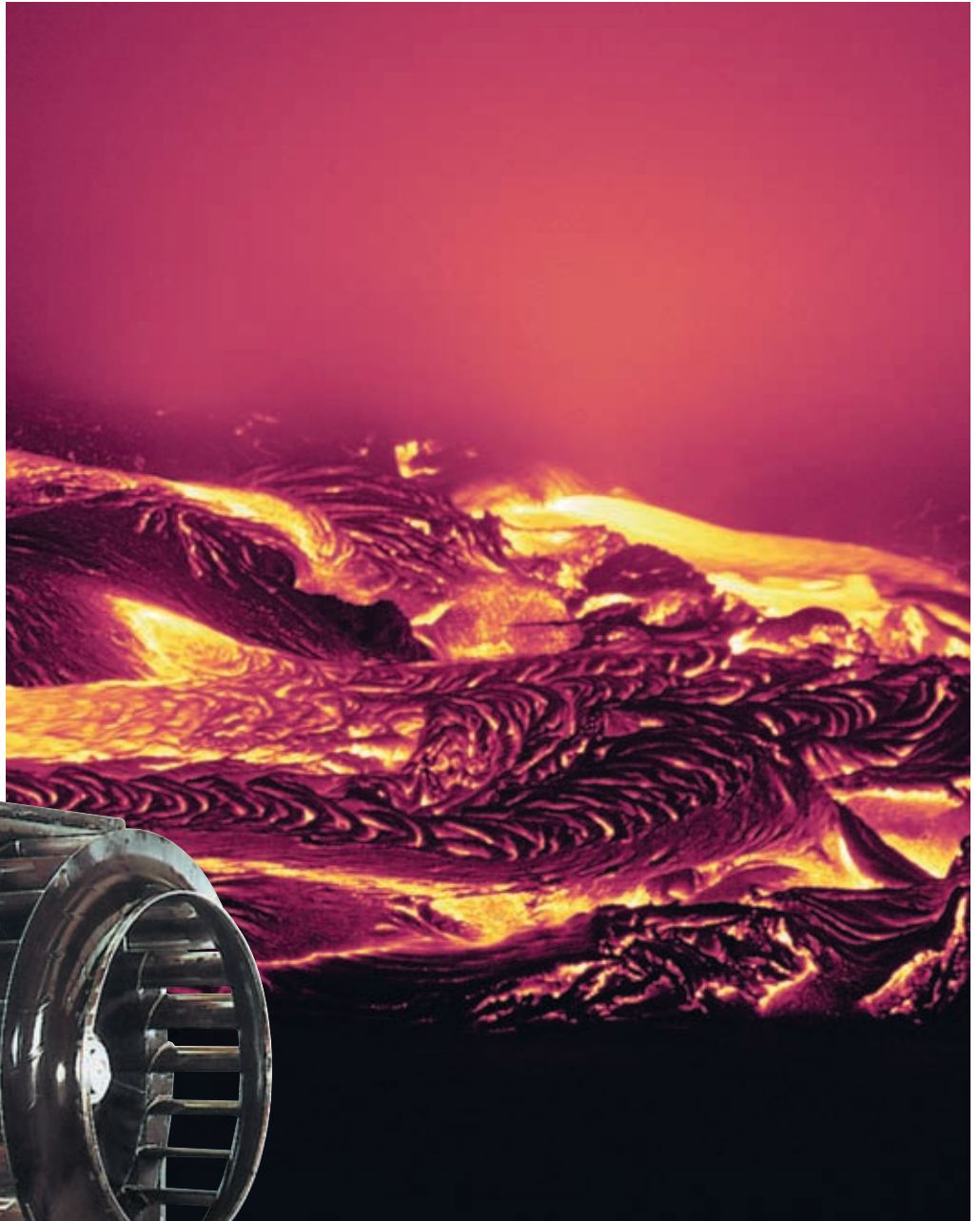
## **Fans for industrial furnace production**

Planning, manufacturing,  
installation and service



*Did you know,*

*.... that various types of liquid lava reach temperatures of 800 to 1,200 °C?  
Hot-gas fans from Piller can be operated reliably even at these temperatures.*



## Circulation fan



Continuous furnace for aluminum molded parts

Hot-gas circulators are used in a variety of industrial heat-treatment furnaces to improve convective heat transition and for more even energy application.

Installation generally occurs via a flange (round or right-angled) as a "plug-in" directly into the furnace ceiling or side wall and can be carried out by the customer thanks to this special design.

An insulating box specially designed for high furnace temperatures reduces heat loss and serves as a platform for the motor and bearing.

When the Piller circulation fans were being designed, special emphasis was placed on two key features: compact size and ease of installation.

This is why Piller offers direct coupling of the motor and blower impeller as version M and the belt drive as version R for special speed adaptations.

Intelligent detail solutions enable the safe use of standard motors with temperatures up to 800°C. The customer then no longer needs to stock up on expensive special replacement motors.

Special solutions that guarantee reliable operation are available for extreme applications and temperatures up to 1,200°C.

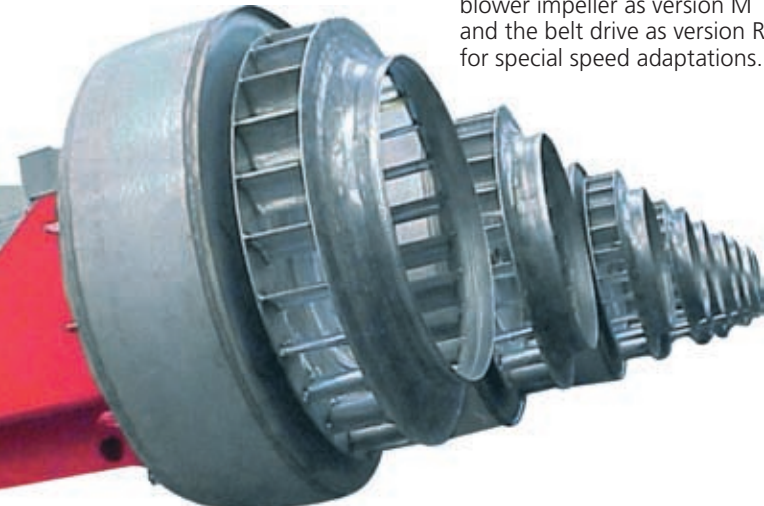
These include:

- water-cooled motors
- water-cooled insulating boxes
- emergency cooling in case of emergency switch-off at high temperatures
- gas-tight models

- motors with special shafts (e.g. Inconel 600)
- dual-speed motors for lowering the speed at high temperatures

Example furnace types equipped with Piller circulation fans include:

- continuous furnaces
- chamber furnaces
- strip suspension furnaces
- aging furnaces
- pit furnaces
- high-convection furnaces
- pusher furnaces
- roller hearth furnaces
- walking beam furnaces
- etc.

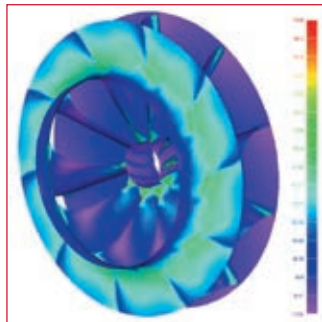
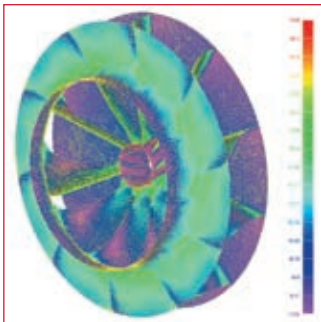


## Blower impellers: the heart of a fan

High-temperature blower impellers require different design specifications than conventional blower impellers. With these types of impellers, a compromise between a high degree of effectiveness, utilization of the tensile strength of the materials that is still remaining at high temperatures and a justifiable production expenditure must be found.

For this purpose, special blower impellers are available for standard applications with

an eye toward economy and minimal investment costs. For higher pressure ranges, Piller offers a blower impeller design that provides absolute peak performance at high temperatures. With these special blower impellers, a circumferential speed of 170 m/s can easily be reached, even at almost 600 °C. These features were not available until the introduction of the FEM, which we also use successfully for other developments.



Strength calculation via FEM (Finite Element Method)

## Blower impeller materials:

The selection of the blower impeller material, in addition to the mechanical design, is essential in determining the service life and performance of the blower impellers.

### Up to 600 °C

■ 1.4878

### 600 °C and up

■ 1.4876 (Incoloy 800)

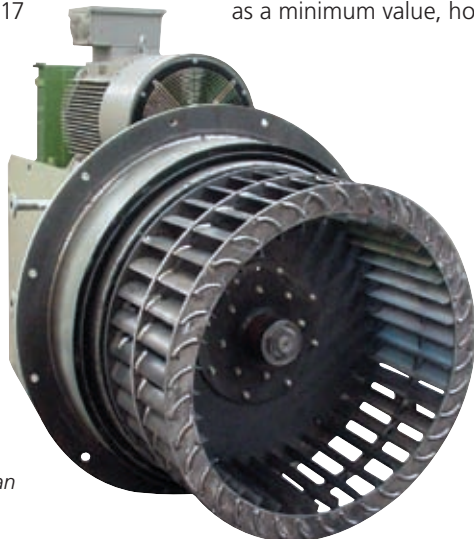
■ AVESTA 253 Ma

■ Inconel 617

Naturally, even these select materials reach their physical limits at extreme temperatures or high circumferential speeds, and adaptation of dimensions for fatigue resistance is no longer possible.

In these cases, the blower impellers are designed using the creep rupture strength method.

A minimum creep rupture strength of 10,000 hours is set as a minimum value, however.



Circulation fan for 850 °C



Blower impeller processing on a heavy-duty lathe

## Bearings:

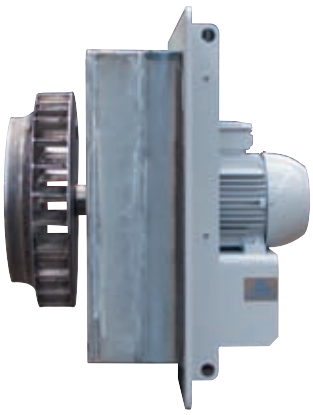
While original motor bearings are used with version M (blower impeller mounted on the motor shaft) thanks to their special shaft-hub design, tried-and-tested rolling bearings with a grease lubrication are available for the belt drive version. Additional bearing cooling is not needed, thanks to the sophisticated design (e.g.

large cooling disks) and minimizing of heat transition from the furnace to the mounting plate of the circulation fan. This reduces investment and energy costs and increases reliability.

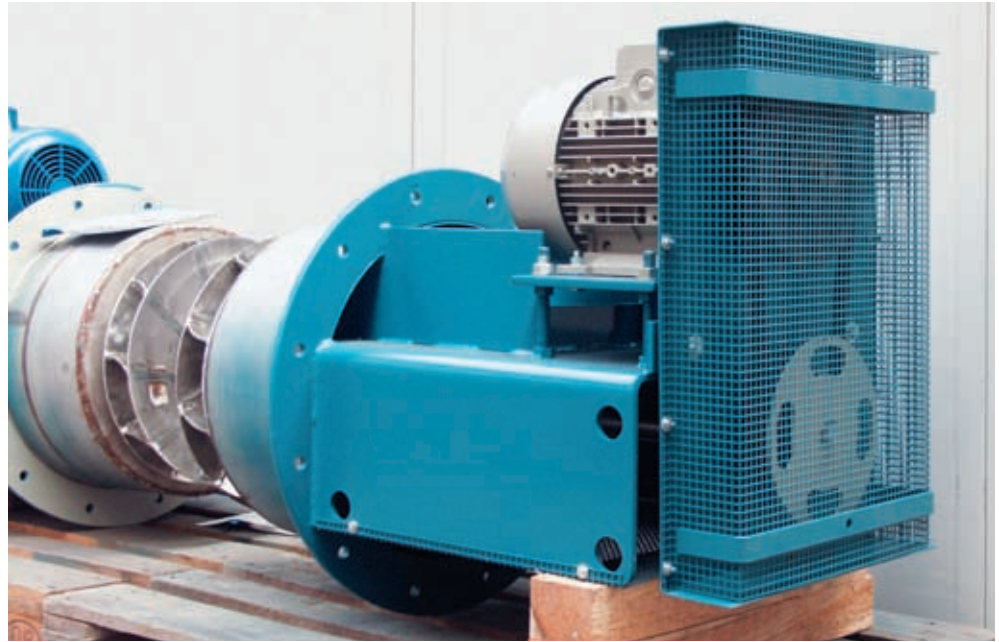


Circulation fan for strip suspension system (650 °C)





Standard fan for 800 °C



Circulation fan for the ceramics industry (670°C)

### Shaft seals:

In addition to reasonably priced stuffing box seals for standard applications, carbonizing labyrinth seals can be used when necessary, for example if a gas-tight design for complete separation of the furnace from the surrounding area is required. By using a sealing medium, the undesired flow of ambient air through the shaft seal (in negative pressure mode) and the emission of furnace gas (in positive pressure mode) are prevented.

### Insulation materials:

To reduce heat transition to critical fan components, thereby minimizing heat loss and increasing reliability of the fans, it is essential to integrate an efficient insulation system into the fans. High-quality, environmentally-friendly materials (chosen based on the area of application) are used in Piller circulation fans for this purpose.



### Service-friendliness:

If, despite the high quality of Piller circulation fans, more extensive service is required, our design allows quick replacement of the entire unit (plug-in system) or its components.

This ensures continuous operation of the furnace and great added value for our customers.

**Should you have any further questions, please do not hesitate to contact our Service Department.**





*Our headquarters  
in Moringen*

**We are represented  
throughout the  
world:**

Australia  
Austria  
China  
England  
Germany  
Hungary  
India  
Israel  
Italy  
Japan  
Korea  
Malaysia  
Romania  
Spain  
Switzerland  
United States of America



**Further information is  
available under:**

[www.piller.de](http://www.piller.de)



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