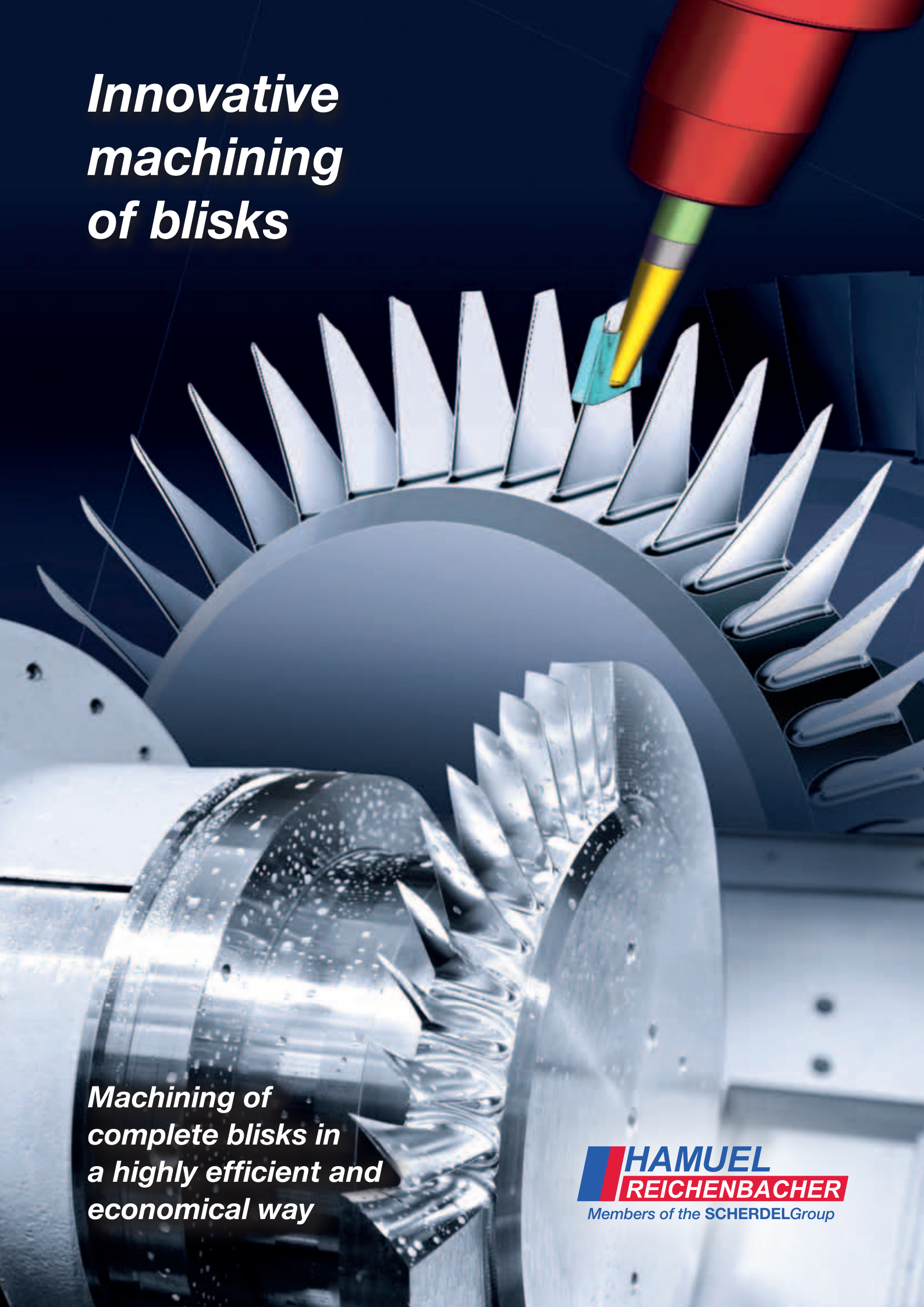
Innovative machining of blisks



Machining of complete blisks in a highly efficient and economical way

HAMUEL REICHENBACHER
Members of the SCHERDELGroup

Turbine construction
Competence
Engine construction
Gas turbines
Experience
Aircraft construction
Power

Most modern technology

In particular where the production of aircraft engines is concerned, the demand to reduce consumption acts as the driving power for innovation. This demand can exclusively be met by a reduction in weight along with an increase in efficiency.

This situation has provoked the use of highly developed, light-weight, heat-resistant materials and the combination of individual components, consequently a reduction of fits and joints. Owing to higher speeds, especially circumferential speeds, as well as three-dimensional blade configurations, this increase in efficiency causes greater demands on component performance.

The challenges mentioned have led to the development of blisks, components where functions have been integrated to a high degree to replace the fitting of individual blades.

Sophisticated manufacturing processes

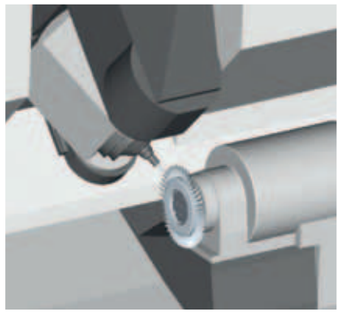
Efficiency as an argument

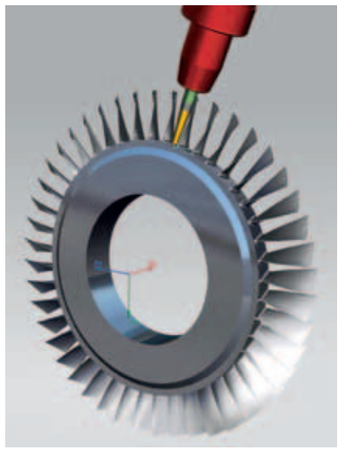
Today, turbine manufacturing simply cannot be imagined without blisks. They have largely taken the place of individual blades mounted on disks. The word blisk combines the terms blade and disk.

Manufacturing a blisk means the lateral milling of blade profiles from a forged disk using a CNC-milling machine. This disk is clamped to the A-axis and can be rotated while being machined by the 5-axes milling head. Here, pivoting is exclusively done by the milling head.

The intricate geometry of such a blisk requires a lot of know-how and mature state-of-the-art milling machines.

All this can be taken for granted at HAMUEL.





The advantages of using blisks:

- No joining of blade foot and disk
- No mounting
- No influence of a possible joint on component behavior, for example owing to centrifugal forces at high speeds
- Increased efficiency of the turbine
- Longer component life, as no cracks can form at the blade feet

Example of a configuration:

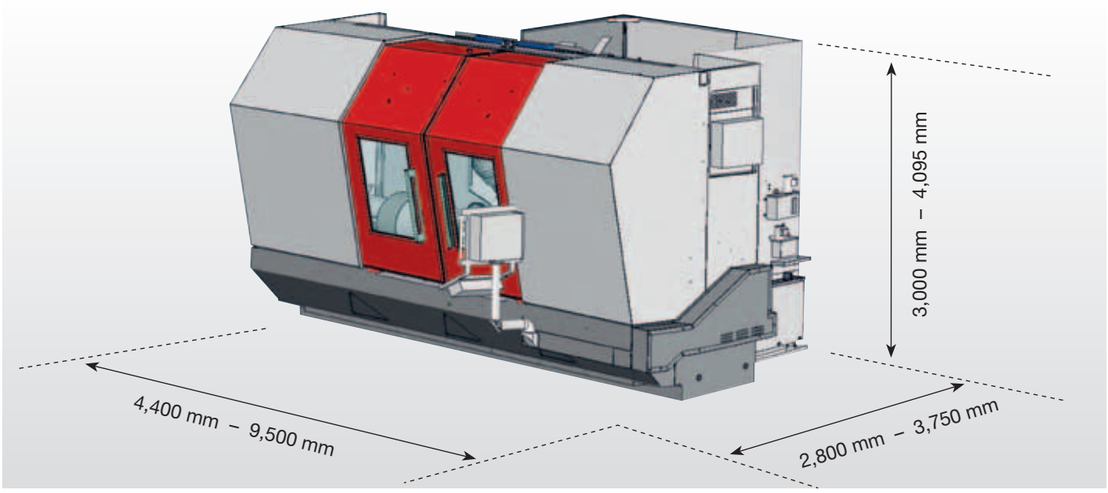
Type of machine	HSTM B 850
Main axes	
X-axis	910 mm
Y-axis	400 mm
Z-axis	590 mm
Component dimensions	
Blisk diameter	850 mm
Machine dimensions	
Length	4,800 mm
Width	3,000 mm
Height	3,200 mm

Travelling speeds	
Linear axes:	65 m/min
B-axis:	100 min^{-1}
Acceleration	
Linear axes:	1 g
B-axis:	15 s^{-2}

Tool data (standard)	
Tool interface:	HSK-A 63
Max. tool diameter:	80 mm
Max. tool length:	250 mm
Max. tool weight:	6 kg
Tool magazine:	24 / 36 / 60

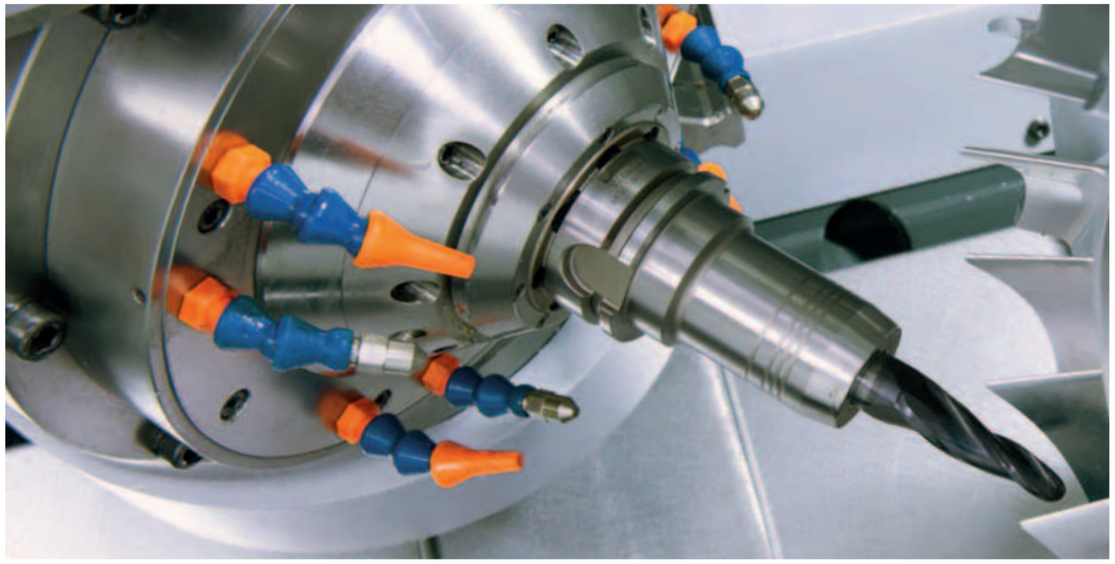
Component spindle	
Interface:	HSK-B 160
Torque:	1,530 Nm
Speed:	180 min^{-1}

Basically, blisk machining will be possible in all machines of the HSTM series.



A strong partner for your blisk machining

Your advantages at HAMUEL



Advantages of using a HAMUEL machine for blisk machining:

- Flexibility: the same machine can manufacture either a blade or a complete blisk
- Blisk clamped in a fixed horizontal component axis
- During the process, the blisk performs a purely rotary movement, whereas all pivoting movements are effected by the milling spindle or the tool
- Owing to the basic mechanic design of the machine axes, the tool can access the blisk blades from both sides
- Exploitation of the great technological potential already acquired for the blade processing machine

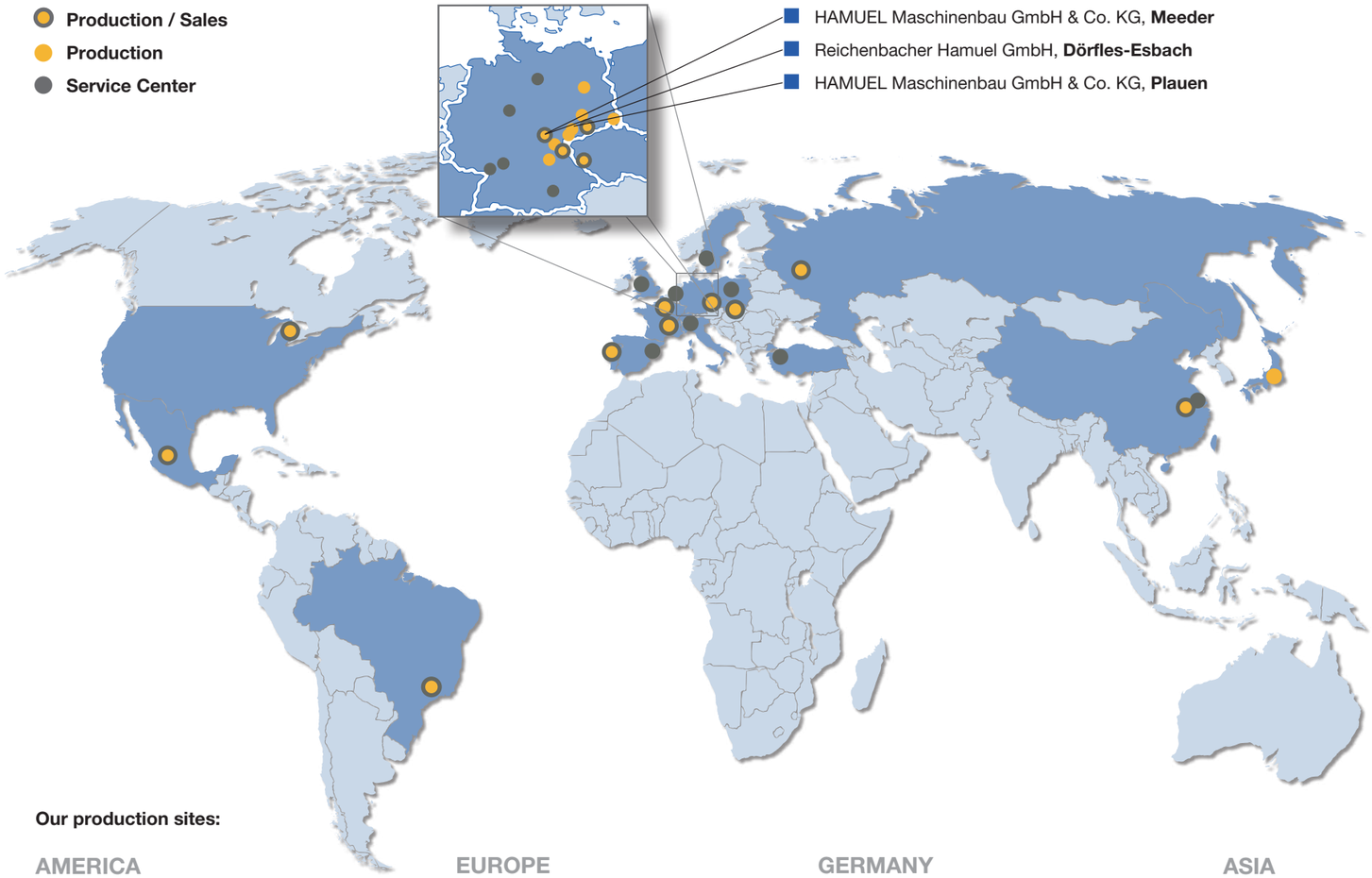
SCHERDEL

Local roots, worldwide presence

The SCHERDEL group of companies with its headquarters at Marktredwitz in the North-East of Bavaria has gone global featuring 29 locations with 37 production sites and more than 4,500 employees. The members of the SCHERDEL group offer to the market a wide range of products and services, while the individual companies are operating flexibly and autonomously in the market.

Each of these companies can resort to the longstanding experience and the know-how of the other members of the group. This results in precious synergies that will not only save the customer's time and money, but also present him with entirely new perspectives.

Only in the fields of mechanical and plant engineering, as well as tool manufacture, the SCHERDEL group employs more than 600 people. Our customers appreciate the strong synergies inherent in our group of companies, as in accordance with the "full-service-principle", they provide them with comprehensive solutions to their problems.



Our production sites:

AMERICA
Brazil, Sorocaba
Mexico, Leon
USA, Muskegon

EUROPE
France, L'Arbresle
France, Beauvais
Portugal, S.J. da Madeira
Russia, Kaluga
Slovakia, Myjava
Czech Republic, Bor

GERMANY
Berlin
Chemnitz
Coburg
Erlangen
Marktredwitz
and its region
Marienberg
Plauen
Röslau
Seifhennersdorf
Treuen

ASIA
China, Anqing
Japan, Aichi

HAMUEL REICHENBACHER

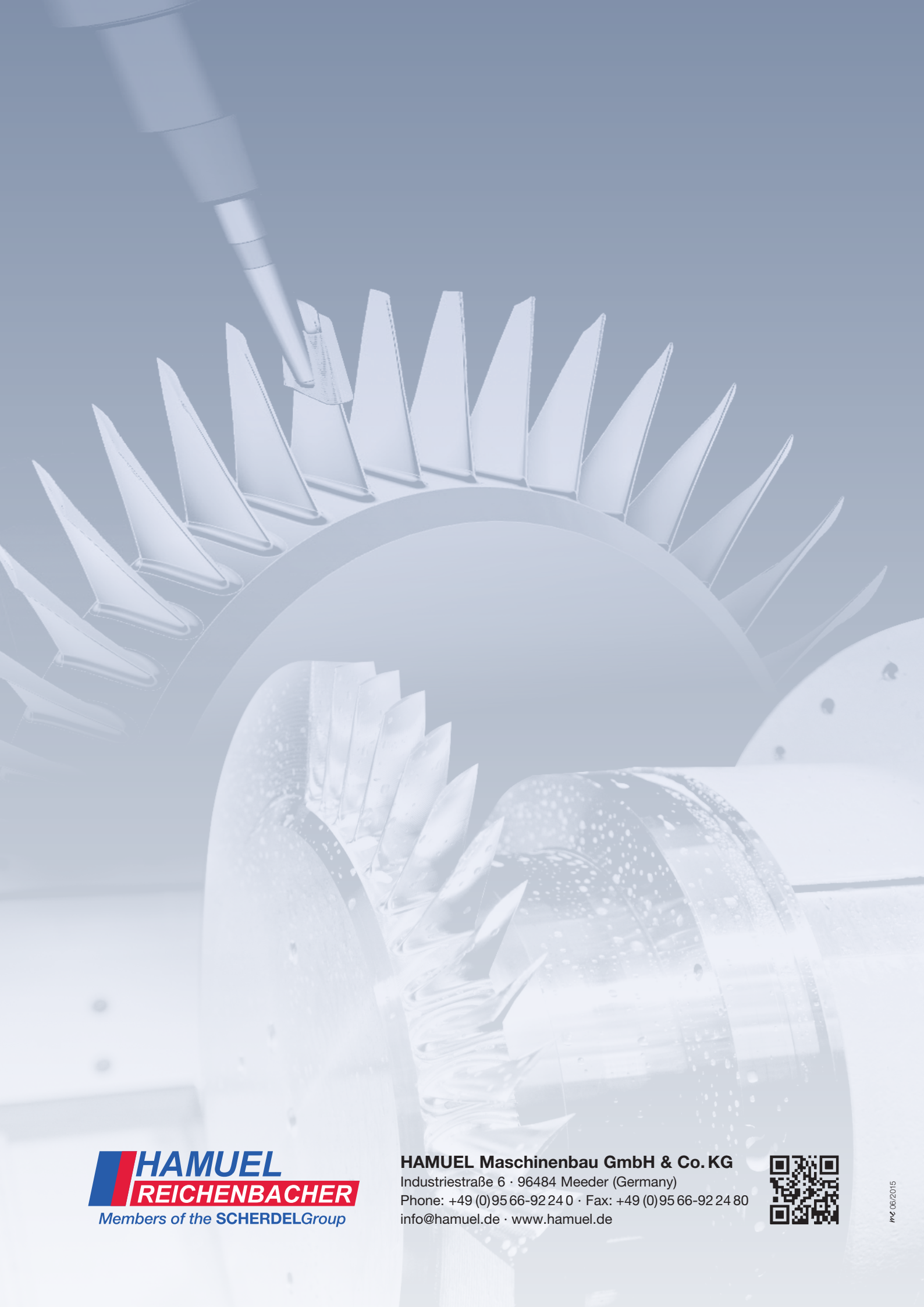
The HAMUEL REICHENBACHER group of companies

The HAMUEL Maschinenbau GmbH & Co. KG is part of the HAMUEL Reichenbacher group of companies. The other companies are the Reichenbacher Hamuel GmbH, as well as the HAMUEL Maschinenbau Plauen GmbH & Co. KG. These three companies operate under the name of HAMUEL Reichenbacher.

Almost 100 years of experience in mechanical engineering, as well as about 30 years of know-how in CNC-machining are self-explicatory: nearly 4,000 CNC-machines produced by this group are in use in the most diverse industries all over the world. Many in-house developments and patents document the great inventive capacity of this group of companies.

Our products:

- **HSC-TURN-MILLING CENTRES**
- Machining centres
- Multi-technology milling machines
- Portal milling machines
- Component manufacturing
- Mineral casting
- Software
- Machine installation
- Retrofit



HAMUEL
REICHENBACHER
Members of the SCHERDELGroup

HAMUEL Maschinenbau GmbH & Co. KG
Industriestraße 6 · 96484 Meeder (Germany)
Phone: +49 (0) 95 66-92 24 0 · Fax: +49 (0) 95 66-92 24 80
info@hamuel.de · www.hamuel.de

06/2015