DIAMAIL

Newsletter from DIAMETAL AG · www.diametal.ch 1/14

EDITORIAL

Dear Readers

In European economic comparisons Switzerland occupies one of the top positions time after time, especially when it comes to the capacity for innovation. Depending on the assessment criterion applied, countries like Denmark, Germany and Finland share the top rankings with our country.

Conspicuously innovative are our SMEs, i.e. firms with less than 250 employees. This is shown by the latest survey carried by the KOF Economic Institute on behalf of the Swiss State Secretariat for Economic Affairs SECO.

Innovation is also an important priority at Diametal. Both divisions are constantly working on various development projects so as to provide the new products and expertise to meet the demands of today's and tomorrow's markets.

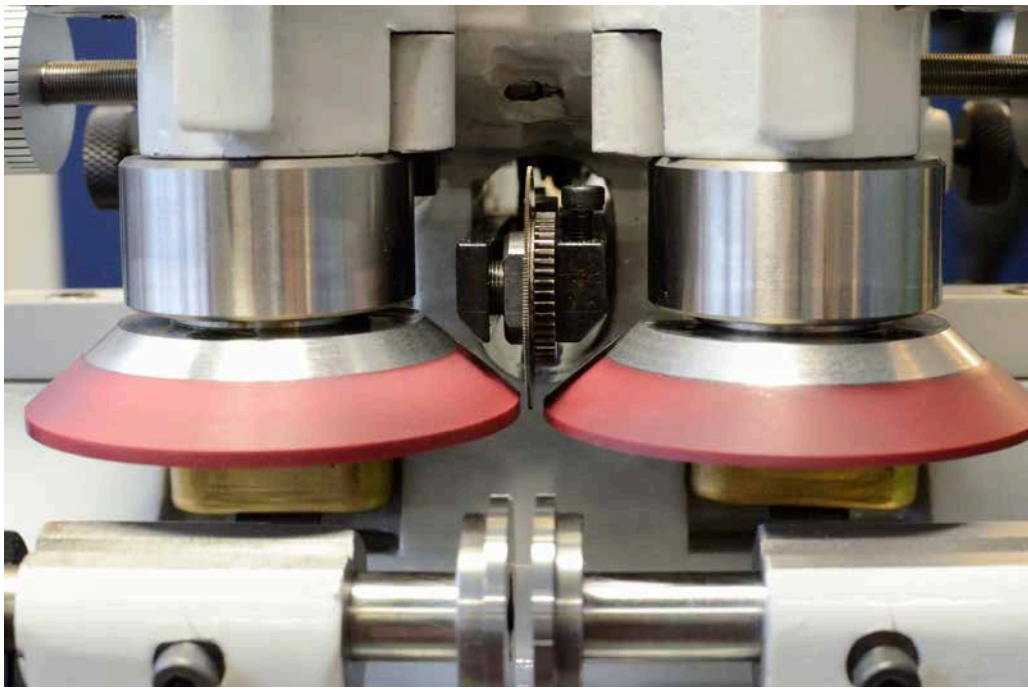
In this issue I am pleased to present you with a selection of our various development activities, a glimpse of our test workshop, and some of our latest innovations.

If you have specific questions about the topics or products, talk to our advisory staff at the coming EPHJ or get in touch with these team members directly under the contact details in «MORE INFO».

Dr.-Ing. Michael Op de Hipt, CEO Diametal

TEST DEPARTMENT

Everything changes and advances very fast in this day and age. The technology and machinery as well as the material to be machined have to satisfy strict and demanding criteria. In order to meet the requirements of this constant progress of development, Diametal has established a new test department.



The heart of the burnishing machine

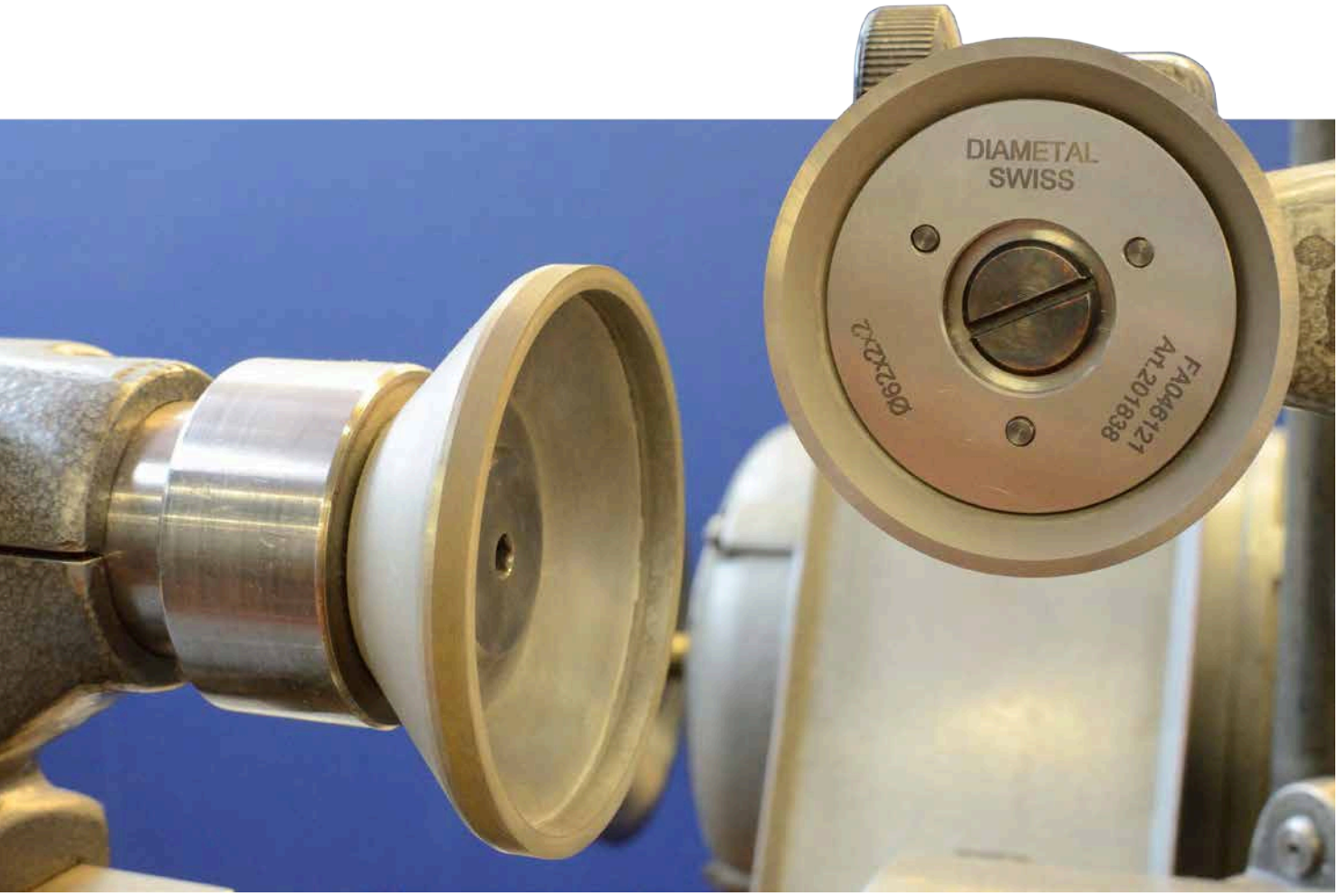
The function of this department is to continuously test out our newly developed tools so as to be able to provide products that are as technically evolved as possible before field trials take place.

The department consists of various machines including a roller-burnishing and grinding unit. This enables us to carry out trials with the currently familiar materials, but also with novel, lead-free steel alloys. These are being tested today as a replacement alloy for 20AP since it can be expected that production of this steel will decrease sooner or later.

The objective of the test department is to perform tests on new products from the development carried out at Diametal in order to offer our customers an even wider range of solutions. In the first phase, the burnishing wheels will be the particular focus of the trials, followed by the other product categories.

Although roller-burnishing mostly occupies only a small part of production, companies in the field of metallurgy are nevertheless con-

Continued on page 2



The burnishing wheel (right) is being sharpened with the diamond wheel (left)

cerned to find an alternative to leaded steel that is suitable for the different operations in the watch industry. In the interest of our partnerships, Diametal is also involved in this endeavour with practical trials.

In this context, we are also turning to our customers for assistance: we are looking for components made of different materials that can be roller-burnished and that originate from overproduction or that already have machining defects and can no longer be used. Diametal guarantees that all parts received will be destroyed after the completion of the test series to make sure they cannot mistakenly pass into circulation. The results obtained are also documented with photos in the test report.

We hope to have kindled your interest in our test workshop and look forward to a close cooperation and frank communication. Let us show you the latest technologies and help you make the precise and demanding work in the area of roller-burnishing in the watch industry a little easier as a result.

Please also feel free to contact us if you have any requests or suggestions regarding our trials.

MORE INFO

Contact:
Eléonore Girardin
Tel. +41 32 344 32 27
eleonore.girardin@diametal.ch

The polishing of gear wheels and its history

In the next issue of Diamail we will be examining in further detail the subject of gear wheel polishing and the support disks used for this purpose. This article will also include a brief look at the history of a company that has been further developing the related machinery and technology over many years.

MANUFACTURE OF GEAR TOOTH SYSTEMS BY MEANS OF HOBBING

Diametal shortens the «time to market» with its industry-proven simulation

The industry-proven simulation tools allow Diametal AG to reflect the real conditions of the cutting process. As a result, typical sources of error can already be detected and eliminated during the design phase of the hob cutter: profile errors are a thing of the past. Expensive and time-consuming prototyping is no longer necessary.

Diametal AG can draw upon more than 50 years of in-depth expertise in the design and manufacture of milling cutters for the production of gears and gearboxes. Moreover, the company has been using modern calculation methods in the construction of hobs for 15 years now. In addition, we are able to model complete tooth profiles and create a full three-dimensional simulation of the milling geometry and the roll motion. This is carried out using mathematical models that have been developed by the construction designers at Diametal AG and then integrated into modern CAD simulation tools.

All milling tools that Diametal AG produces are systematically and completely modelled. It is only then that they are released for production. These include gear hobs with involutes or cycloid profile as well as adjusting mills.

Customer requirements for the production of frontal or conical teeth are constantly changing. Diametal AG responds to this with a high degree of flexibility and offers hobs that are specifically tailored to these requirements. Daily experience from industrial practice shows that these custom-developed hobs are fully functional and completely efficient straight away. How is that achieved?

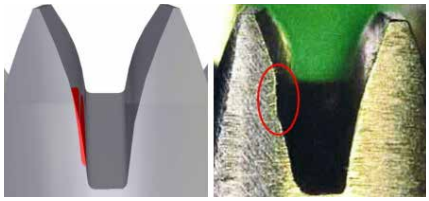
The latest 3D simulations are particularly adapted for:

- Frontal teeth (type Breguet, clutch, crown wheel, ...)
- Conical gears
- Gear tooth systems with special geometry, special shapes

Our offer to you:

- We compare your model with our virtual simulation result
- You can integrate our virtual 3D gear tooth system in your own CAE environment

In order to provide such complex tools in a very short time and in a reliably functional condition in their first design version, Diametal AG has developed a 3D simulation over the past few years that is precisely adapted to these requirements. The models implemented in the simulation enable the real contact geometries and the rolling kinematics to be represented precisely. The cutting conditions are depicted exactly as they exist between the actual hob cutter and the actual component to be machined in the machine tool.



The defective spot (left) becomes visible in the gear (right).

3D simulation for the teeth of a conical gear wheel

The modelling includes parameters such as the exact position of the hob, the lead angle and the direction of rotation. As a result, the different machining cycles can already be considered together with the customer before even a single chip is produced in the manufacture of the cutting tool.

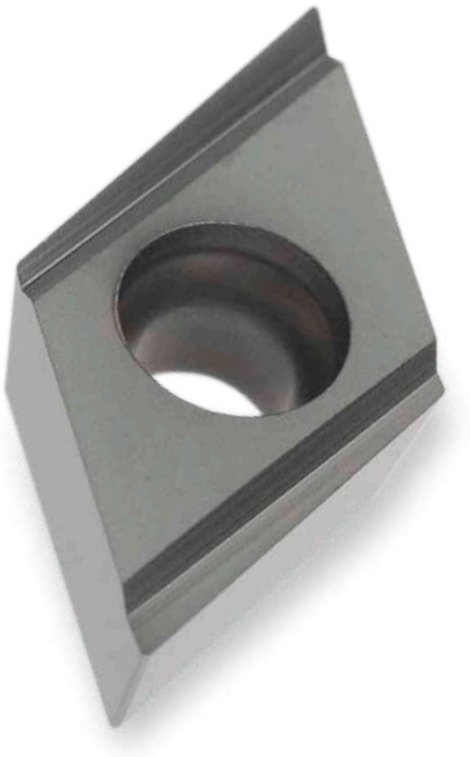
The achievable results on the customer's component in terms of precision and cutting performance can be reliably evaluated at a very early stage with the help of our simulation tools and compared with the customer's expectations – and this can be done with extremely little effort and expense. Furthermore, any effects such as marks on the surface (machining traces) can already be identified and eliminated at this early stage.

MORE INFO

Contact:
Anthony Paganopoulos
Tel. +41 32 344 32 22
anthony.paganopoulos@diametal.ch

WHEN THE TOOL LIFE IS A SURPRISE!

Especially in today's manufacturing, increases in tool life are often only possible in small jumps. For practically every cutting task, there are specific tools available whose geometries and coatings are so sophisticated that it is only the smallest of details that today decide whether the one or other percent more service life can be achieved or not.



As a user, however, can one really be certain that one is really deploying the best possible tool available on the market for the respective application?

Is the production of 800 turned parts made of 1.4404 steel with a single indexable insert a lot – or is even more possible?
To obtain an informed response to this question, the consultants of the different suppliers are mostly contacted. They then select the appropriate tools from their own experience or pick them out from their range of catalogues or from in-house documents.

And is one now convinced as a user? No, still not! This is because one hardly has the time to test all the possible suppliers and their numerous variants.

In addition to the tool manufacturers with a worldwide reputation, there are also a large number of smaller companies in the field, each with a high degree of specialisation. They may not cover the full spectrum of all applications, but in the particular niche in which these manufacturers operate, a surprise or two can still be reckoned with.

Diametal AG, in particular, succeeds again and again in achieving astonishing advances as regards the service life of tooling with the help of targeted customer trials. The test tools are defined together with the customer and engaged directly on the machine. And so it transpires, just as it should: the measured surface roughness remains constantly low and the workpiece diameter will not become larger either. If we have then exceeded 3 times the tool life compared to the competitor›s insert, which effectively occurs again and again, the joint objective has been more than achieved. Do you also have turned parts for which a comparison might be worthwhile?

Feel free to contact us. We›ll find the solution together!

MORE INFO

Contact:
Michael Zuber
Tel. +41 32 344 32 95
michael.zuber@diametal.ch

DIAMETAL AT THE BASELWORLD

Once again Diametal has made available its 50-year history of technical expertise in the manufacture of high-quality watch components.

A ceramic housing with a glossy silk finish and a base and bezel made of polished carbide convey even greater class and cachet to the outstanding workmanship of the Biel-based watch-maker Armin Strom. Our services embrace the development, installation of inserts and the complete assembly of all watch components in this unique and limited edition series.

Discover this little marvel of engineering at our stand D08 at the EPHJ 2014.

MORE INFO

Contact:
Dany Warter
Tel. +41 32 344 33 01
dany.warter@diametal.ch

MORE PROFIT THROUGH THE REDUCTION OF IDLE AND SET-UP TIMES

Grinding of drills and mills with polished flute made of solid carbide

The demand for boring and milling tools with a polished chip flute made of solid carbide is steadily increasing. The non-ferrous metal and composite material processing industry relies on such tools because tools with a polished spiral groove have a much longer service time – with the same cutting performance.

The economical production of such a flute has always been a challenge for the toolmaker.

Based on existing, commercially available grinding tools, there was no other solution than to grind the groove from the solid using a rough-grinding wheel. Subsequently, the channel formed in this way had to be extensively reworked with the help of a polishing wheel and with repeated adjustments of the feed settings of a few hundredths of a millimetre.

However, this solution is not without its problems.

Owing to the very low setting for the polishing, the rough-grinding wheel and the polishing wheel – must be absolutely identical in their form.

The grinder is thus forced to intervene in the production with constant monitoring and corrective action through the frequent dressing of the rough-grinding wheel and by a repeated alignment of the rough-grinding and polishing wheel.

The development department of Diametal AG has now taken up exactly this problem.

The main focus was placed on the polishing. It quickly became clear that a real improvement in the existing practice can only be achieved if the polishing wheel is able to correct the form errors generated by the rough-grinding wheel.

This means that a polishing wheel had to be developed that not only polishes perfectly but also manifests a cutting performance that can handle material removal of 0.2 - 0.5 mm in the roughing process without any problem.

Our developers achieved the breakthrough in this field with new Polistar bonds. On the basis of a hybrid bond, it has been possible to embed fine abrasive grains in such a way that a sufficiently large grit free-stand can be generated with them in order to ensure a stable cutting efficiency.

Thanks to the cutting performance of the Polistar grinding wheel, which is unusual for polishing wheels, the production strategy could now be changed. Whereas it was the rough-grinding wheel that mainly determined the form and dimensional tolerances before, this task can now be transferred to a full extent to the polishing wheel with the help of the new solution.

The result is impressive! The new strategy has enabled a reduction in the idle times of over 30%.

In the field test, the new Polistar wheel was used in combination with our MNTplus rough-grinding wheel. The MNTplus wheel has a durability that is roughly twice as high as conventional rough-grinding wheels.

The combination of MNTplus for roughing and Polistar for polishing do we have saved 30% of the downtime – the productivity has therefore been improved by around 10% in total.

MORE INFO

Contact:
Beat Gilomen
Tel. +41 32 344 32 89
beat.gilomen@diametal.ch

TOP & BOTTOM GRINDING

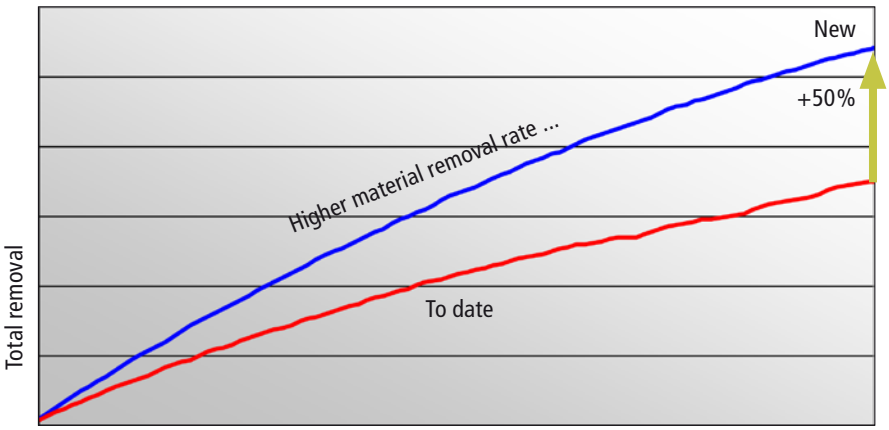
New developments at Diametal - wheels for top & bottom grinding very hard materials allow a significant increase in the removal rate with less force.

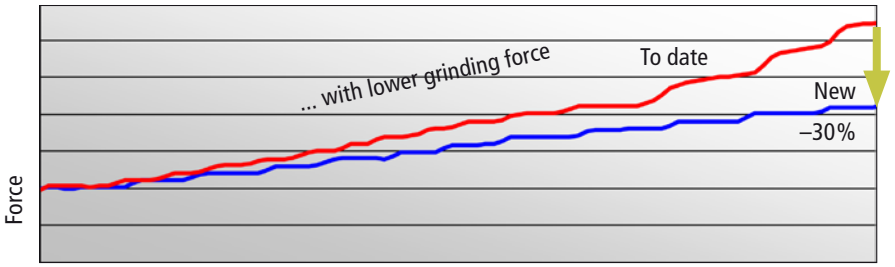
The constant further development of quality and productivity in the wide range of grinding applications has resulted in new product lines for metal-, ceramic- and resin-bonded grinding wheels.
Motivated by these successes, DIAMETAL has also pushed forward development in the area of top & bottom grinding as well.
For this purpose, the development team has a specially created test facility at its disposal.

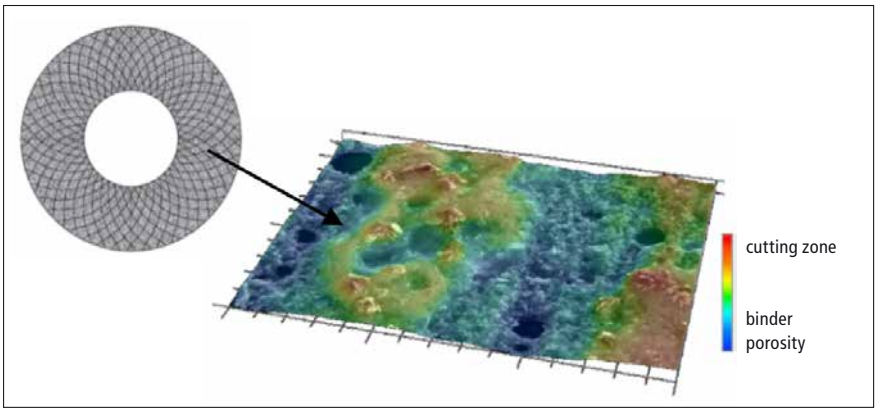
This makes it possible to identify the positive factors influencing the grinding tools and to define the tool best suited to the requirements.

With its system and a specially adapted arrangement of the cooling slots, DIAMETAL has achieved a number of successes in the double-sided machining of various materials.

DIAMETAL is therefore able to offer a suitable solution for your demanding applications as well, or to develop one in a short period of time.







Structure of the grinding layer (Keyence VHX-2000 image)

MORE INFO

Contact:
André Scheidegger
Tel. +41 32 344 32 37
andre.scheidegger@diametal.ch

TRADE SHOWS

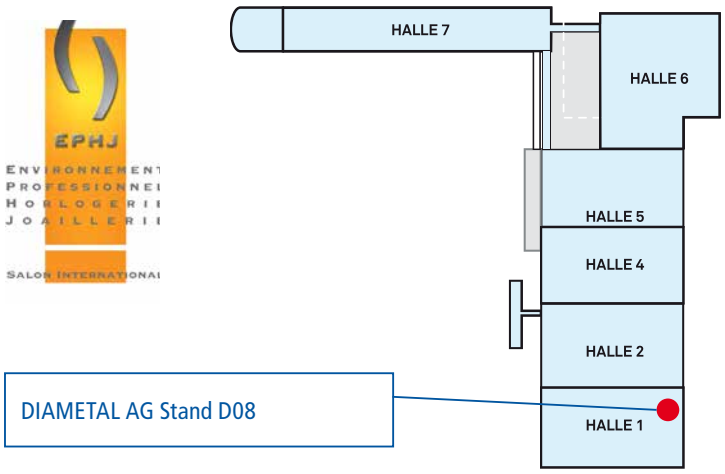
EPHJ 2014
Genf CH
17.-20.6.2014
www.ephj.ch

Turning Days Süd 2015
Villingen-Schwenningen DE
17.-20.4.2015
www.turning-days.de

AMB 2014
Stuttgart DE
16.-20.9.2014
www.amb-messe.de

Diametal and ARO TECHNOLOGIES are once again exhibiting together at AMB and Turning Days Süd in Villingen-Schwenningen. Both companies look forward to welcoming you at their stand!

EPHJ 2013 in Geneva CH



From 17th to 20th June 2014, Diametal AG will be exhibiting at EPHJ 2014 at booth D08. This event will certainly be worth a visit: the EPHJ (Professional Watchmaking-Jewellery Environment) brings together the business community and professions of watchmaking, jewellery making, microtechnology and medical technology in one single place.

IMPRINT

DIAMAIL is a publication from DIAMETAL Ltd., DIAMETAL France SA, DIAMETAL Italia S.R.L. and DIAMETAL Precision Tooling (Nanjing) Ltd. DIAMAIL appears two times a year in the following languages:

German	1200 copies
French	800 copies
English	250 copies

Editors
Tooling, Carbides & Ceramics:
Michael Zuber,
michael.zuber@diametal.ch

Abrasives:
Dany Warter,
dany.warter@diametal.ch

Editorial, International:
Dr.-Ing. Michael Op de Hipt
michael.opdehipt@diametal.ch

Flash, preview, coordination, contact: Mireille Barras,
mireille.barras@diametal.ch

Please mail any requests for additional copies or issues, any questions you may have, and any notification of changes of address to: diamail@diametal.ch

DIAMETAL AG
Solothurnstrasse 136
CH-2504 Biel/Bienne
Tel. +41 32 344 33 33
Fax +41 32 344 33 44
info@diametal.ch
www.diametal.ch

Printed on environmentally friendly paper from controlled forest cultivation.