June 2004
Issue No. 11

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Milling Printed Circuit Boards with STEP FOUR

10TH anniversary STEP FOUR

STEP FOUR

Customer Information

Now STEP FOUR milling systems can be used to produce printed circuit boards quickly and easily: from the initial design to the ready milled and drilled

Milling a printed circuit board.

Without any doubt insulation milling is a much better alternative than the tedious job of making films, exposing them and then etching a printed circuit board. Being able to mill the boards yourself also means you no longer have to wait for ages while they are done. The new method is technically and economically superior to traditional etching, especially for one-off pieces, samples and small batches.

First of all you need a printed circuit board program. Our company has had very good results with EAGLE, which is available in various editions ranging from the free-of-charge Light Edition to the multi-functional Professional Edition.
The EAGLE Light Edition has the following limitations:

- The useable surface of the board is limited to 100 cm x 80 mm (4 x 3.2 inches).
- Only two signal layers (top bottom) can be used.
- The circuit editor can only produce one side.

If you wish to make money with the freeware version of EAGLE Light, you will have to obtain a licence. For further information please refer to www.cadsoft.de.

Once the circuit board has been designed, an outline has to be created. In EAGLE this is done with the aid of OUTLINES.ULP and then saved as an HPGL file. This is exported and imported into the STEP FOUR milling software. Chuck your printed circuit board material and you can start milling. As usual, you define the milling parame-

www.step-four.at

ters such as the advance speed, for example. We found 600 mm/min along the X/Y axis and 100 mm/min along the Z axis at a speed of 45,000 U/min to be ideal.

We always use special insulation routers with a drilling tip designed for milling printed circuit boards and drilling fixture holes simultaneously. Next the insulation paths are milled. Optimum results call for an engraving fixture with height control to compensate varying levels, thereby ensuring a constant engraving/milling depth and evenly wide insulation paths. Using the milling spindle system of STEP FOUR in combination with the engraving fixture (please note our special offer on the last page!) leads to first class results.
Should you prefer to work without the compensation described above, the board will be have to be chucked completely level. This is usually really difficult, as the board material may be slightly bent.

Chuck the material completely level

In addition, the machine table may also be uneven in places.
After finishing the insulation milling, you still have to drill the fixture and soldering holes with the same router and drilling tip. Finally, apply a layer of soldering lacquer and the board is ready for use.

Trade Fair Report

From April 19 to 25, 2004 a great many people visited our booth at the INTER-MODELLBAU in Dortmund. This year again a lot of interest was shown in our products, which proves that CNC technology has become part and parcel of model building.

Editorial

We're Moving!


Ernst Ramberger

As you may have heard, we are celebrating our tenth anniversary at STEP FOUR this year. That in itself is of course no reason to expand, but since our old premises are really cramped for space, it is a good opportunity to move.

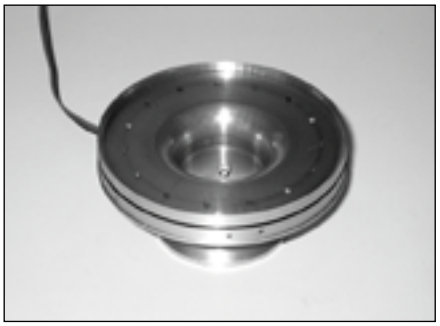
Due to excellent business developments since STEP FOUR was founded in 1994, our number of employees and product range have grown and grown. STEP FOUR is literally bursting at the seams! After looking intensively for the past months, we have finally found premises that suit our requirements. Once certain modifications have been completed, we will probably be able to move to the new building in August. 1300 m² space should be plenty for the next few years and there is even enough room to expand.

We are looking forward

The whole team at STEP FOUR is really looking forward to having more space, thus ensuring more efficiency in production and sales. And, of course, if you would like to come and visit us, we will be delighted to offer you a much better reception. The fact that the move coincides with our anniversary is another reason to celebrate. And that is exactly what we intend to do around the first weekend in October. Then we will throw a birthday cum house-warming party in our new building.
Details on the celebrations will be provided in the anniversary issue of STEP FOUR due at the end of August.

STEP FOUR User Wins Competition

Michael Achtelik, a young, highly motivated Basic 540 user, won the "Jugend forscht" (Young Scientists) competition in Bavaria in April, qualifying for the national German competition. Now he has won the technology prize in the national competition.
He writes: "My entry was a homemade model turbine. Both the expert jury and the public were fascinated by the project and the many precision-made components involved. Special praise was awarded to the CNC milled parts, and the jury was extremely impressed that some of the parts had been able to be produced on the relatively small STEP FOUR CNC machine, without the need for large industrial units."
The components shown to the right show two essential parts of the turbine: the guidance system and the compressor lid. Note also that both parts were simply manufactured with 2D software.
For further details on the competition, go to http://www.jugend-forscht.de/html/nav/f_wet.html



■ Compressor lid of the turbine

□ Guidance system of the turbine

ELTE Electric Spindle with Incorporated Inverter

The main attraction of this 3-phase asynchronous motor is its robust technology, ideal for processing wood and plastics. A special feature are the high-speed ceramic bearings. The built-in inverter enables the speed to be regulated directly at the motor.

Special Introductory Price

This precision device not only operates fast and cleanly, it produces little noise. At a power rate of 400 W, the speed range extends up to 24,000 rpm. The chuck range is from 1 to 7 mm. Special introductory price until 30 June 2004. EUR 890,-. From 1 July 2004: EUR 970,- plus value added tax.

■ ELTE electric spindle with incorporated inverter.

Step-Four CNC-Forum

Since the beginning of April there has been a CNC forum on our website, in which milling and hot-wire cutting techniques are discussed in general, and people exchange specific data on our products. The leader of the forum is our enthusiastic STEP FOUR user, Rudi Schneeberger.
Why not log in and benefit from this unique source of information? Simply go to our website at www.step-four.at and click on "Step4 CNC-Forum".

10th anniversary STEP FOUR

USB-Dongle

The WING designer, the program for designing modelplane wings, is now available with USB dongle. This takes into account the fact that more and more new PCs and laptops no longer have a parallel interface. WING designer users, who are already registered and who wish to use the software on a new PC, can exchange their parallel dongle (please return it to us) for the USB dongle for only EUR 54,-.

Imprint

Published by:
STEP-FOUR GmbH,
Haunspergstraße 90,
A-5020 Salzburg
Austria
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Fax: ++43 (0)662 459378-20
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Layout and production:
***JAGER* PR**, www.jager-pr.at

■ ball-bearing spindle in Precise 1000 U

New Feature

The Precise 1000 U milling machine, the special unit for 3D processing, is now also available with ball-bearing spindles. This means even higher milling speeds can be achieved, leading to increased productivity in 3D applications. The maximum positioning speed is at 4,500 mm/min. The rise of the X/Y spindles is 10 mm at a diameter of 16 mm, and that of the Z spindle is 5 mm at a diameter of 14 mm. All three axles are equipped with shaft supports in this model.

■ Acoustic horn of trumpet on axis of rotation

Engraving Unit

At the moment we are constructing a highly interesting special unit for a large manufacturer of brass instruments. The mechanics of the standard Precise 760 machine has been fitted with a special base and modified with special accessories. This is the first unit that will implement a special version of the new Windows software due in the autumn together with rotational axis control. By combining the unique tilt construction with a rotational workpiece mount, it is possible to engrave any instrument individually, quickly and in top quality.