

ISMR Says: Bystronic and TRUMPF outline current laser cutting trends and purchase factors, as well as advising users how to get the best from their machines

The Final Cut

ISMR talks to laser experts from TRUMPF and Bystronic to discuss their views on the latest laser cutting developments and future technology trends.

Laser cutting machines produced by various machine tool suppliers have really tackled how to control laser beam focus to attain high cutting speeds so that users can cut thin sheet metal more rapidly and increase overall productivity.

Alongside current trends pointing towards higher automation, even higher laser cutting machine performance and greater speed, trends have been detected for more simplicity, leading to less complex, higher quality laser cutting machines.

ISMR spoke to two subject experts at **Bystronic (Urs Singer, Head of Customer Relations and Technology Networking)** and **TRUMPF (Eberhard Wahl, Product Manager 2D Laser Cutting)** to gauge their views on the latest laser cutting developments and future technology trends.

ISMR: Which factors, do you feel, are instrumental to customers when making the decision to purchase a laser cutting machine? Which laser user trends have you discovered over the past few years?



Eberhard Wahl (TRUMPF):

Firstly, users choose the machine which fits their needs concerning sheet metal format and sheet thickness. Afterwards, the selection starts. The most important criteria is the

Below: **The TRUMPF 2030 laser cutting machine**

productivity of the machine. In the last few years, the main criterion for productivity was the cutting speed. Nowadays, we see a strong trend towards maximum productivity over a longer period. This leads to issues such as faster pallet-changing or unmanned operation with a one-cutting-head strategy or an automatic nozzle exchanger.

Urs Singer (Bystronic): In the past few years, we have seen users choosing machinery in a more careful way. If it was a 'horse power' race in the earlier days, users are nowadays more careful and look at their needs in a more 'differentiated' way. More and more, we see our users analysing the entire production process, from order entry to the delivery of products to their customers.



This means that downstream operations become as important as the cutting - the right parts need to be cut at the right time in the right quantities and flexible press brakes need to bend those parts for welding and painting so as to have the right parts ready for assembly in time. Such overall consideration leads to an efficient and competitive production process.

Software plays an important role too and will speed up the preparation of cutting plans after the release of orders by an ERP system. It also assists in the efficient off-line programming of press brakes.

To improve just one step in the production process could easily result in the efficient creation of heaps of parts at the end of one process and therefore the value of Work In Process would increase instead of increasing the overall throughput of the production process. ➔

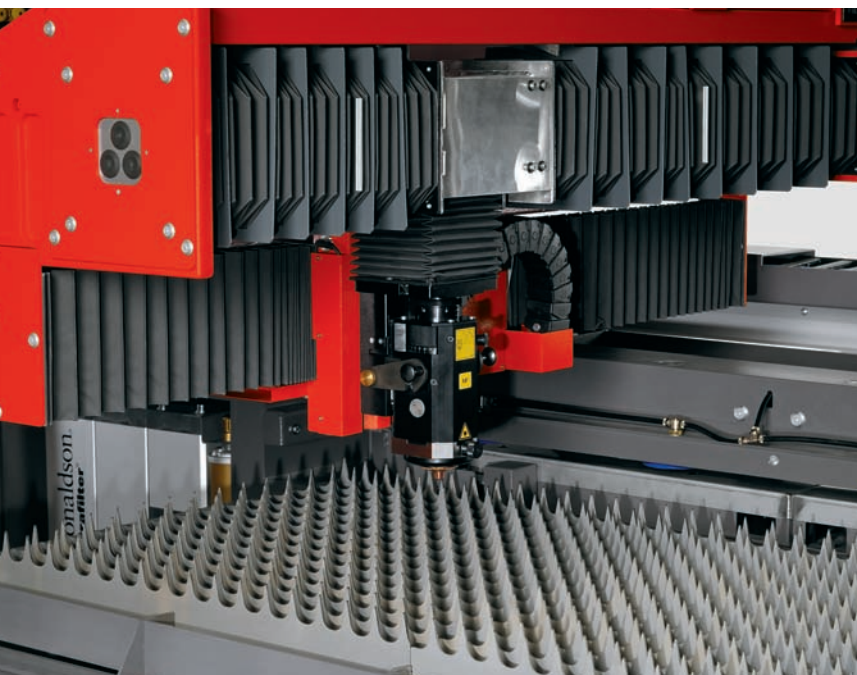


➤ **ISMR: How can users get the best out of their laser cutting machines in terms of speed, cutting efficiency and accuracy? Which specific features of your laser cutting models offer speed, cutting efficiency and accuracy advantages to users?**

Eberhard Wahl (TRUMPF): The use of our SprintLine and FastLine technologies drastically lowers the overall laser cutting process time needed, whilst keeping the quality continuously high. SprintLine ensures that fast piercing, marking and gas purging are carried out more quickly by reducing axis motion to an absolute minimum. The greatest time saving is gained for parts that have numerous closely-spaced contours. FastLine improves the entire cutting action ensuring maximum economy: Processing times can drop by up to 30% in thin sheets. The new process also diminishes slag residue on the top of sheet metal. In combination with PierceLine, the result is even better: This process strongly reduces the piercing time while also improving the piercing quality (smaller holes). To maximise the speed, users can develop their own parameter sets for their specific material and process requirements. It is also possible to adapt the dynamic of the machine to the specific task.

Urs Singer (Bystronic): Before investing in a laser cutting machine, you need to analyse the material to be used, the material thicknesses and the lot sizes which a potential user requires for his new machine. Based on these parameters, the user will be well advised to choose a highly dynamic cutting machine (for cutting mostly thin material), a machine with a high output power (for cutting thicker material and/or non ferrous metal cutting with nitrogen as

Below: **Bystronic Byvention** offers high throughput, even for small batch sizes



the assist gas) or a highly flexible machine if he is targeting very small lot sizes.

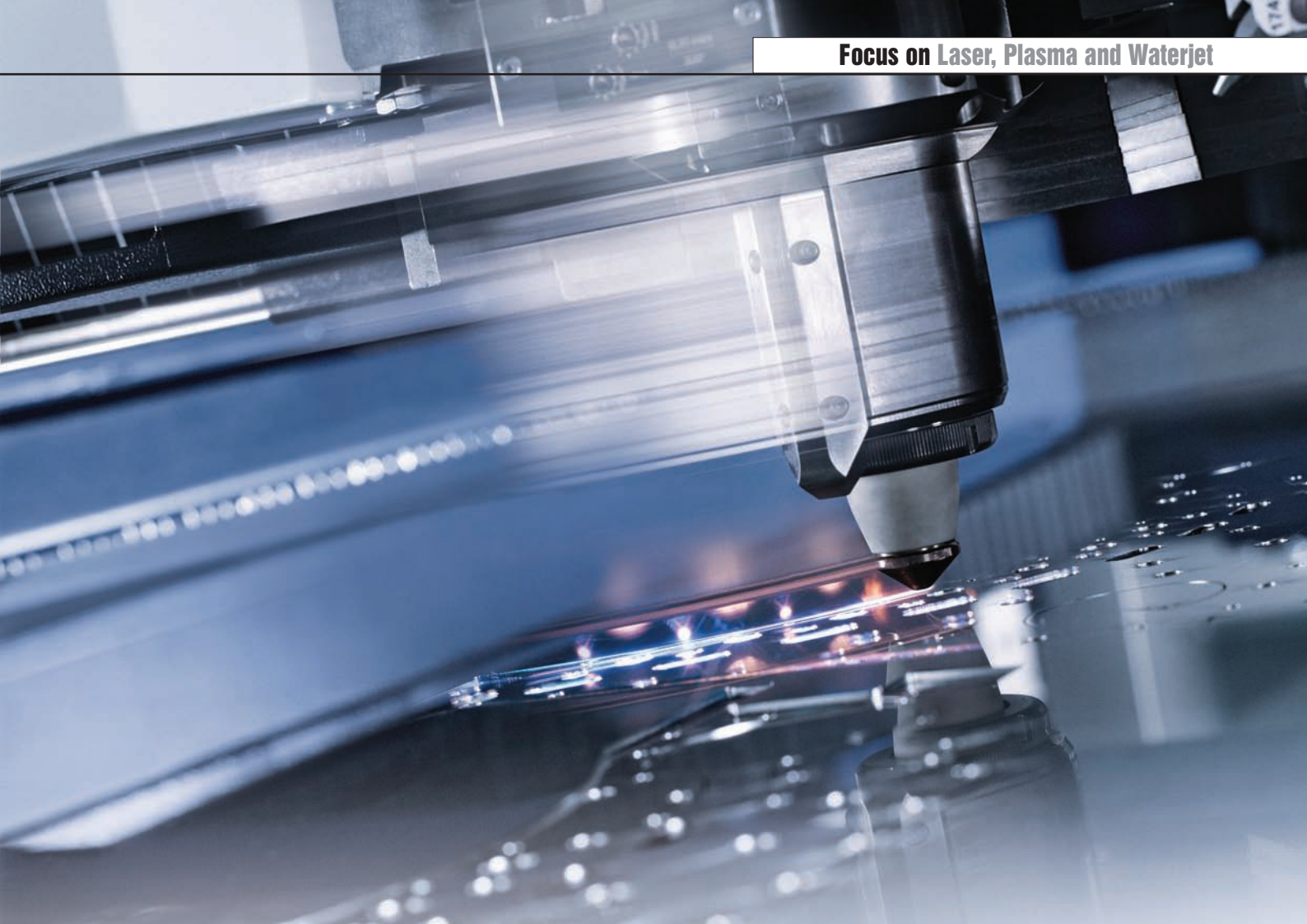
Depending on the analysis, I would recommend either our Byspeed laser cutting machine - with extremely high dynamics - a Bystar (ideally with a 6 kW resonator) or a Byvention, for efficient standard production with high throughput even for small lot sizes. For general laser cutting of a wide range of materials, Bysprint serves as a solid general purpose machine for output powers of up to 3kW.

If a user sees orders which will mostly fill one or several sheets of a particular quality and thickness, the addition of handling/automation might further help to improve the profitability of his operation.

ISMR: Please give details of any of your newly launched laser cutting technologies/machine models and their specific features and capabilities which are of interest to users?

Eberhard Wahl (TRUMPF): There are two examples that I would like to mention. These are the TruLaser Series 5000, which incorporates the TruLaser 5030 (working range 3000mm x 1500mm), 5040 (4000mm x 2000mm) and 5060 (6000mm x 2000mm), and the TruLaser 2030 with an integrated loading and unloading unit, which will shortly be available with a stronger laser.

TruLaser Series 5000: Using the approved Le Mans strategy, the TruLaser Series 5000 would win a 24-hour race by making the fewest number of pit stops and thus shaving its running times. The modern flatbed laser cutting machine simply adapts to the differing road conditions – in this case, sheet metal types and gauges. Even working at night presents no problems. The single cutting head strategy, the automatic nozzle exchanger, the intelligent cutting head interface and the integrated collision protection all ensure – in combination with extensive automation – that the TruLaser Series 5000 can get along with just a single set-up cycle. It can largely do without ‘pit stops’ during the entire sheet metal processing run, and that means extremely high productivity levels. The highlight of the TruLaser Series 5000 is the single cutting head strategy. Thanks to newly designed beam guide and cutting head interface, all sheet thicknesses can now be processed using the same cutting head. The machine automatically changes the laser beam depending on the material to be processed – no need to switch the head. That’s especially helpful for automated operation with various materials. With the optional nozzle exchanger, there is no need to manually exchange the nozzle. The integrated collision protection saves the cutting head from damage - the cutting head folds away



Above: **TRUMPF**
T-4061 cutting head

during a collision. Thanks to the intelligent cutting head interface, it can be returned to its place using a handle. The cutting head automatically re-assumes the correct position in case of small collisions. A further benefit of the TruLaser Series 5000 is the new FastLine process – as described previously. The proven TruFlow 6000 laser is almost maintenance-free thanks to a magnetic bearing radial turbine blower. Its power can be regulated as needed. At the TRUMPF in-house exhibition INTECH 2007 (27 November – 1 December 2007) the TruLaser 5030 was shown with a 5kW laser for the first time.

TruLaser 2030: The flatbed laser cutting machine is designed to provide fast automated processing of thin sheet metal. It combines high-speed laser cutting with the advantages of an integrated loading and unloading unit. The working ranges for the TruLaser 2000 series thus extend from 1250 x 2500mm up to 1500 x 3000mm. Its CO₂-Laser TruCoax combines high-frequency technology with diffusion cooling. This resonator is of extremely rigid and compact construction and ensures very high laser beam quality which enables high rates of processing. The machine was equipped with a 2kW laser so far. On the INTECH 2007 the TruLaser 2030 was shown with a 3.2kW laser for the first time. This version will be available from next summer onwards.

Urs Singer (Bystronic): With ByVention, we have launched a new concept where the user can produce 80% of average production at an investment of 50% of a top-of-the-range machine. A number of customers have chosen this concept to complement their current laser cutting machines.

On handling/automation side, we have launched the new ByTrans which is a highly economic solution. ByTrans has also been adapted for high dynamic and therefore shorter sheet processing times. Its cycle time has been considerably reduced.

With the 6kW laser, our Bystar becomes a powerful machine for the processing of thicker material and for N2 cutting. The resonator is a solid piece of technology with modern full solid state power supply resulting in low operating cost.

ISMR: Please give your views on fiber laser technology for users. Do you have, or are you planning, any developments in this area? What are your views on disk technology?

Eberhard Wahl (TRUMPF): At the LASER 2007. World of Photonics trade show, TRUMPF introduced its TruFiber 300. As a single mode fiber laser, the TruFiber 300 has a laser power of 300 W and is best suited for precision cutting and welding. This addition ➔

to the product line emphasises the focus that we place on applications. The TruFiber 300 achieves a beam quality of $M2 < 1.1$, expanding the spectrum of pulsed and cw lasers from TRUMPF in the performance range of under 1kW.

As far as disk technology is concerned, there is no doubt that the disk laser is, by far, the most successful multi kilowatt laser in the world. All decisive projects in the automotive sector have been won by the disk recently. But the whole fuss made on the multi-kilowatt side detracts from the great possibilities at the lower end of the power spectrum. That's why we introduced the single mode fiber laser at the LASER show. The fiber laser will certainly find its place within the laser world. But our experience indicates that its field of application will predominantly be in the lower range of performance.

There might even be a place for the fiber as well as for the disk laser in the cutting market – at least for thin sheet metal. But, at the moment, it's simply a matter of fact that – for physical reasons – cutting with 1 μm yields less good results compared with the 10- μm -wavelength of the CO_2 laser. For companies who need a really flexible laser cutting machine to process a great variety of materials and sheet metal thicknesses, there is no alternative to the CO_2 laser so far and there won't be any in the future as far as we can see.

Urs Singer (Bystronic): We did show a 'Concept Machine' of a fiber laser cutting system at the Laser 2007 exhibition in Munich last June. This machine was equipped with a 2kW fiber laser. We have extensive experience in cutting various materials and we know where the challenges lie.

In an effort to extend present limitations, we continue to work with suppliers and with world-class institutes. We have also registered IP for certain processes which will be important in the future development of cutting with fiber lasers.

In our detailed evaluation of the different non- CO_2 lasers, we favoured the fiber laser for a number of technical reasons.

ISMR: Can you split/segment your current laser customer base by country (region) or type (i.e. subcontract job shop)?

Eberhard Wahl (TRUMPF): We sell to job shops, product shops and contract manufacturers. Our export quota currently lies at around 70%. Western Europe is our main export region with 40%, followed by America and Asia. Italy, France, Spain, Japan and the Czech Republic are fighting for third place in country ranking, following Germany and the US.

Right: **Bystronic ByStar**



Urs Singer (Bystronic): As far as a numeric split of our user base goes, in 2006 we generated 47% of our turnover in the countries of our Market Region Europe North/East, 24% in the Market Region Europe South/West, 16% in the NAFTA countries and 13% in Asia/Pacific. Looking at the type of customers we serve, 60% are job shops, 20% are companies with over 50 employees who, in part, make their own products and another 20% are large corporations who make their own products.

As far as the products are concerned, segmentation happens within the individual companies rather than between the companies belonging to the above groups. For instance, a sub-supplier working for OEMs under contract works in a similar way to the OEMs themselves. Alternatively, some OEMs do a certain amount of 'in-sourcing' and need to act like a job-shop for at least part of their time. Geographically speaking, we see of course a clearer trend towards automation in places with high labour costs and/or very stringent labour laws.

ISMR: What are your views on the future development of the laser cutting market? Do you see any new market areas or applications emerging? How do you see the future?

Eberhard Wahl (TRUMPF): Fully automated systems and unmanned operation will become more the standard in bigger companies. Even more flexibility in highly productive machines will be the trend for smaller job shops.

Urs Singer (Bystronic): Automation will continue to gain importance in laser cutting and in downstream processes. The dynamics of cutting machines for thin sheet metal will further increase. **END**

ISMR: Eberhard Wahl and Urs Singer, thank you very much.