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Oxy-fuel, plasma or laser?

Whether in the engineering, electrical, food, chemical or mining industries, or in construction, agriculture and, among other things, in the production of decorative items, CNC machines are used for the thermal cutting of materials everywhere.

Manufacturing companies realize that the CNC machine is a long term investment, and thanks to this, the supplier of the equipment needs to communicate flexibly over the life of the machine. Both Czech and foreign customers traditionally turn to Czech brands with confidence. If they are satisfied with the machine in the long run, they usually welcome the possibility of upgrading the old equipment or buying new ones from the same supplier, even if they want to expand the range of products or supplement them with products that require new modern technology such as a laser.

The Czech specialist in thermal cutting technology is a family owned company Vanad 2000 a.s. from Golčův Jeníkov, a manufacturer of CNC machines for the cutting of material by oxy-fuel, plasma, and fiber laser. Thermal cutting of materials has undergone considerable development over the last decades. Each of the thermal cutting methods has its advantages and disadvantages and usability limits, all three are constantly evolving.

Cutting with oxy-fuel

Cutting with oxygen is limited to the dividing of unalloyed and in some cases also low alloyed steels. This limitation comes out of the method principle, which is based on the combustion of the cut material by oxygen. The surface of the cut material preheats first to the ignition temperature and after letting cutting oxygen in, the combustion of the material – exothermic reaction takes place. Combustion products arising as a product of the burning are blown out in the form of slag by a stream of oxygen and cutting kerf is created. To get a good quality cut, the ignition temperature of the cut material should be lower than the melting point. Melting temperature of combustion oxides should be lower than the temperature of the cut material. Furthermore, important thing is to have sufficient warmth released for maintaining of the cutting process while burning. Unalloyed steels best suit above mentioned conditions. With oxygen, it is possible to divide thicknesses even bigger than 1,000 mm, and most of the times 300 mm thicknesses are cut. Oxy-fuel cutting is the oldest and generally the slowest method of thermal cutting.

Plasma cutting

Plasma cutting technology is often used for a cutting of materials with medium thickness, for unalloyed steel 30 mm thick, high alloyed steel up to 100 mm. A common speed of plasma cutting is $2 \text{ m} \cdot \text{min}^{-1}$. Plasma cutting process performance depends mainly on the type of the plasma source, the construction of the torch and plasma and shield gas used. Among the disadvantages of plasma cutting, there is a higher noise level, a bigger

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amount of harmful emissions inception, which is solved by lower suction directly in the exhaust table in Vanad machines.

Proper mashine

Cutting machines from Vanad company are outstanding, easy to use and fast data preparation. Most of them are characterized by simple block construction and thanks to it a workstation can be adapted to the production requirements of the future user Hardware and control system is developed in cooperation with B&R company. Vanad is an authorized partner of the most significant manufacturers of plasma and laser technologies of thermal cutting of the material, i.e, such as Hypertherm, Kjellberg, Formica, IPG.

Machine parameters allow processing of all regularly available metal materials. Vanad laser machines can also cut some non-metallic materials, cardboard, and klingerit for example. The company produces machines with compact and gantry constructions. Equipment dimensions are designed according to the customer's needs. The biggest CNC Vanad machine delivered is 54 meters long. Vanad machines are equipped with basic data collection systems, remote diagnosis system for example.

Fiber Lasers

Laser cutting of the material is distinguished mainly by high precision and the cutting speed. Above all, the cutting speed depends on the thickness of the material and laser source performance, it is also affected by the type of assistance gas, size, and the shape of the cut part. For very thin plates cutting speed can exceed $100 \text{ m}\cdot\text{min}^{-1}$. Fiber lasers are used mainly for metal cutting, they can be also used for cutting of non-transparent non-metallic materials. Laser cutting machines are mostly used for the cutting of the material up to 10 mm thickness, the maximum thickness is 25 mm. Using the appropriate assistance gas, oxygen most of the times, nitrogen and compressed air, Vanad always tries to tune the technology precisely to meet the customer's production needs.

The company has its own development department, the main purpose is to test new functions and to improve machines, to develop additional technologies or functions added to the machine control system on the basis of a special requirement. Customers often want the machine to be used as much as possible and to perform the widest range of operations on one device Additional equipment and accessories, such as marking unit, drilling unit etc. can help. Vanad also helps with enlightenment in the field of thermal cutting of the materials. Besides consultancy and professional briefings to companies, students of vocational schools also visit Vanda's showroom with a permanent exposition of eight machines. The company has a long run cooperation not only with technical high schools from the related field but also with Czech Technical University in Prague and the Technical university of Liberec. Every year a lot of graduates, bachelor's, magister's thesis are made under the Vanad employee's management.

All grown-up members of Vanad family work in the company nowadays. It is controlled by the founder's two sons (the single owner of the company Luboš Miřátský), the third son is in university studying and simultaneously works as a laser technician in the development department.

„Research and development are always important to us. Customers often refer to us. No matter if they have a new or old machine, our machine or from the other supplier. We provide everyone with professional consultation and we always try to help with the setting of the machine for the production plan. Sometimes it ends up with the fact that the machine is old and does not meet the production requirements anymore. Sometimes the solution is a purchasing of a new machine or some superstructure, etc. Customers are grateful for this approach,“ says Ondřej Miřátský, technical director of the company.

In conclusion

Thermal cutting of the material has a long and rich history, for sure it will have a very interesting future. Despite the appearance of modern more powerful technologies it still stays irreplaceable in every engineering Production.

Photographs in high resolution and additional photos are available on vanad.com/mediaservice. They may only be used for editorial purposes.



KOMPAKT Laser is used for sheet processing of 2,000 × 6,000 mm size, it is equipped with 3 kW IPG laser source and completed with a hydraulically changeable table with two material grids for minimalization of preparation time.



KOMPAKT Laser with the manually extendable grid is designed for 1,500 × 3,000 mm sheets. Laser machines have been manufactured by Vanad since 2012 for the smallest sheet sizes of 1,500 × 3,000 mm, biggest size 2,000 × 6,000 mm with a maximum performance of 3 kW.



KOMPAKT Light machine with its compact construction is primarily designed for plasma cutting. It is popular because of a small built-up area, easy handling of the material and quick assembly.



The BLUESTER machine is used in heavy productions and allows cutting of the material of 400 mm thickness. It can be equipped with ten units, including 3D plasma head for bevel cutting.



The Vanad PROXIMA machine with an additional RotCUT equipment for tubes and profiles cutting.

About VANAD 2000:

VANAD 2000 a.s. – follower of cutting machines production in the Czech Republic. The Company VANAD 2000 a.s. with the registered office in Golčův Jeníkov is a producer of modern design high performance machines for shape cuttings with oxy-fuel, latest plasma technology and fiber lasers. VANAD has employs approximately 50 people at the end of 2017.

Forward-looking statements

This news release may contain forward-looking statements based on current assumptions made by VANAD 2000 a.s. The company assumes no liability whatsoever to update these forward-looking statements or to conform them to future events or developments.