

CROSS-TECHNOLOGY COMPETENCIES IN SHEET METAL CUTTING



Operation-ready systems are waiting for comparison, tests and hand-on trials in the Cutting Center's assembly hall (photo: Klaus Vollrath)

WATER-JET, LASER-JET AND PLASMA CUTTING SYSTEMS - ALL UNDER ONE ROOF UNDER REAL-LIFE OPERATING CONDITIONS

In its Sheet Metal Cutting Technology Center in Neumünster, Germany, KNUTH demonstrates its Plasma, Hydro and Laser Cutting Systems under real-life conditions.



Spectacular spark patterns are a characteristic feature of lasers (photo: Klaus Vollrath)

Professional consultation across all technologies

“Here we have different systems to demonstrate plasma, water-jet and laser cutting systems,” explained Eckardt Möller, Certified Mechanical Engineer, Software Developer and Designer. “We are working with customer-specified materials and contours. This allows us to provide sound advice regarding possibilities, limitations and cost structures.” The staff consists of 15 specialists and highly qualified service technicians, who are familiar with the specific pros and cons of all three technologies. They also know what challenges industrial operators and craftsmen will have to face in the market. These specialists provide objective consultation and carefully analyze the customer’s needs, before they work with the customer to find the optimum solution for the customer’s specific mix of applications. This includes individual custom designs and integration of these designs into the existing production environment.

Wide Range of Options

Knuth offers high-performance systems, but also has developed less expensive system variants. “In many areas of application, like metal or device construction, these systems are only used for single shift operations. In such cases, the required capital investment amounts play an important role,” explained Mr. Möller. Using standardized components for assemblies like machine frames and axis drives or controls, Knuth was able to develop compact base model series that still offer the customer a wide selection of system sizes and equipment packages. If an expansion is needed at a later time, optional automation features, equipment or accessories can easily be added or retrofitted.

Laser: Focus on Fiber Lasers

In the field of laser cutting, solid-state fiber lasers are becoming increasingly more popular. „They provide a higher efficiency factor compared to conventional CO₂ Lasers, while maintenance and lens wear are reduced”, said M. Eng. Damian Sominka, who is in charge of the Laser Technology Division. The ytterbium laser source has a wavelength of 1.07 µm, which is 10 times shorter than the CO₂ laser’s wavelength. It is better absorbed by the metal and provides a stronger beam focus, which results in a very thin kerf.

D.Laser for superior cut quality and Productivity

- » Available with gear racks or linear drive motors
- » Laser power up to 8 kW
- » Travels: 3,060 x 1,530 mm - 12,200 x 2,100 mm

Water-Jet: Focused on Precision Work

"In water-jet cutting the water cools the kerf. Therefore, this so called "cold process" is suitable for sensitive materials and non-metals like ceramics, plastics, composites, glass, etc.", explained Mr. Möller. The hydro cutter uses an extremely thin high-pressure water-jet for precision cuts. A fine abrasive powder can be added to the water for increased cutting efficiency. However, the operating speed is somewhat slower than with a laser cutter.

Vario Series

- » Cutting area: 1,300 x 1,300 mm to 4,000 x 2,000 mm
 - » Can be retrofitted with a wide variety of options
-

Water-Jet Portal Systems

- » Cutting area: 3,050 x 1,300 mm to 3,050 x 8,050 mm
-

5-axis cutter head option

- » Cuts angles up to 60°
 - » Compensates for the cutting edge angle in thicker materials
 - » Simplified CNC Programming:
 - » Due to the kinematic design of this nutating (articulating) cutter head, the water-jet's impact point is also the tool center point.
 - » The use of rotational media guides allows the head to turn infinitely around its own axis.
-

Plasma/Flame Cutter Combination Systems - for higher productivity in thicker materials

"Plasma torches generate an extremely hot (around 30,000° C) ionized gas beam that can penetrate up to 80 mm thick unalloyed steel", says Faruk Saglam, Certified Mechanical Engineer. For high cutting speeds, process gases are used to blow out the resulting smelt from the kerf. The plasma cutter is better suited for medium to large plate thicknesses, where it provides significantly higher productivity than the laser cutter, which can cut stainless steel with a maximum thickness of 30 mm.

Depending on material and system configuration, the kerf can be about 1.35 and 4 mm wide, and cut part tolerances are in the vicinity of ± 0.5 mm. The maximum material thickness is 38 - 80 mm at edge-start, 150 - 200 mm with the optional flame cutter head, and the hole cutting capacity is between 22 and 50 mm.



Component cut from a 2 mm thick stainless steel plate using a laser cutter (photo: Klaus Vollrath)



The cutter head of the water-jet cutting system handles pressures up to 4000 bar. In the center of the image: holder with hair-fine nozzle that forms the water-jet (photo: Klaus Vollrath)



PREMIUM cutting systems Plasma-Jet DSL with 5-axis and tube cutter (optional)

Plasma cutting using Hypertherm technology for plasma source, cutter head, and control software.

Plasma-Jet DSL Series

- » Robust high-capacity systems for around the clock (3 shifts) use
- » Cutting widths: 3,150 to 4,150 mm
- » Cutting lengths: 1,600 to 25,150 mm

Plasma-Jet DSL Compact Series

- » High precision cuts
- » Cutting widths: 1,000 mm or 2,000 mm
- » Cutting lengths: 2,000 mm or 3,000 mm
- » Single-shift operation
- » Very small footprint
- » Tube cutter (optional)
- » 5-axis cutter head for angular cuts and bevels. Upon proper adjustment, this machine compensates for cutting edge angles and allows for clean vertical cut edges (optional)

Plasma-Jet Eco Compact

- » Cutting width: 1,500 mm
- » Cutting lengths: 3,000 mm

Utilization of Development Synergies

Bundling different cutting technologies at our Center of Competence brings key advantages for the development of new machines. In the future, we plan to use as many identical or similar components as possible for machine beds, axes, and options. This generates synergies across the entire value chain, from procurement to assembly and replacement part logistics. "Another goal is to standardize the control software and make the user interfaces and technology-specific options as uniform as possible," explained Mr. Möller. This benefits users and employees alike. Operation and programming are simplified, which reduces the risk of errors.

ADDRESS

KNUTH Werkzeugmaschinen GmbH,
 Schneidzentrum Neumünster, Havelstraße 25,
 D-24539 Neumünster, Germany,
 T.: +49-4321-609-0, T.: +49-4321-609-00
 info@knuth.de, www.knuth.de