The Power of Choice

LASERS BY TRUMPF
The Power of Choice.

Modern laser technology can achieve outstanding results in almost any manufacturing process while making efficient use of resources. When it comes to developing new products, you can rely on light to provide the right tool for your production environment! To ensure you get exactly the technology and support you need, TRUMPF offers a unique range of lasers and laser systems combined with global application consulting, integration support, and comprehensive after-sales service. Put simply, that’s the Power of Choice.

How laser technology from TRUMPF is helping to shape some of the biggest trends in manufacturing and society.

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How to find out which laser technology offers the best solution for you.

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Discover the wide variety of TRUMPF laser technologies in our film “The Power of Choice”: www.trumpf.info/fmpr6x
Your industry. 
Our motivation.

TRUMPF lasers are used in a variety of industries, from cutting micrometer-thin shapes out of display glass to welding centimeter-thick metal for wind turbines. As a key technology leader, TRUMPF is continuously investing in research and development for new technologies and potential future applications. We’re very much aware of the major trends shaping our society – and they give us the motivation to seek even better solutions for your innovative, efficient and high-quality production processes.

Mobility

We may not have reached the stage where our lasers can beam people from one place to another – but they have already proven their ability to support the mobility and logistical requirements that keep our society moving. That includes making cars more efficient, trains lighter, aircraft safer, and ships more stable. Our lasers are also helping to shape frontline themes such as e-mobility.

– kg

Lightweight construction with finely rendered laser weld seams leads to reduced fuel consumption and lower CO₂ emissions.
Effective communication is a must in today’s smart world. Our lasers provide solutions for one of the key processes at the heart of modern technical communication systems – chip manufacturing. As part of Industry 4.0, TRUMPF is also pushing ahead with numerous solutions to digitally connect up production environments.
Energy

Is saving energy a key priority for you and your industry, too? Our highly efficient lasers open the door to energy-efficient production and help make your components lighter and tougher. TRUMPF lasers offer energy-saving solutions in the wind power and photovoltaic sectors, as well as in many other areas.

100 cm²/sec is the ablation rate of our short pulsed lasers, which facilitate the cost-effective production of thin-film solar modules.
TRUMPF lasers are used in medical device manufacturing to create precisely rendered microstructures – and the results are already having a major impact on people’s health and quality of life. TRUMPF is also working together with the Max Planck Institute to develop attosecond laser technology that could, in the future, be used to detect tumors as small as 1 mm.

Stents cut from nitinol or polymer using picosecond lasers reveal a high-quality, smooth surface which leaves no footholds for deposits to build up. That helps arteries stay open over the long term.

$1 \cdot 10^{-12}$ sec
Your application. Our technologies.

Couldn’t we just use the same type of beam source for every single laser machining application? Not a chance! Practical experience has clearly shown that every application has different requirements when it comes to laser technology. TRUMPF offers a full range of industrially relevant beam sources, so we can give you impartial advice on which technology will provide the best solution for your manufacturing business. Choose TRUMPF for your beam sources, system solutions, beam guidance components, focusing optics, and intelligent sensor technology – all from a single source.
Discover the wide variety of TRUMPF laser technologies in our film "The Power of Choice":
www.trumpf.info/fmpr6x
Your needs.  
Our support.

Whether you already know exactly what you want or are looking for a tailor-made solution, we’re at your side right from the word go. The laser is a unique tool – and we’re passionate about the opportunities it offers. TRUMPF has Laser Application Centers (LACs) all over the world ready to cater to your needs. Because we believe you should always be able to find the right partner in the right place – with exactly the right technology to meet your needs.

Tap into TRUMPF as …

... a project consultant

“We can provide you with advice and support from product conception through to production optimization. If the production process is defined in one of our LACs, then we can help you find an integrator if you need one. We’ll work together with you to get the production process up and running and then optimize it until you are completely satisfied with the results.”

Antje Engler, Sales, Detroit

... a service partner

“Our tailor-made packages of support and after-sales service help keep your business running smoothly. If something goes wrong, then our comprehensive remote services can quickly get things back on track. We also offer an extensive range of on-site training programs, upgrades and application services.”

Bastian Becker, Services, Ditzingen
… a technology developer

“We’ve been developing lasers at TRUMPF for more than 40 years. Time and again we have transformed visions into reality with the help of our research partners. And now you can use this extra-ordinary know-how to gain a competitive edge. Take our innovative ultra-short pulsed lasers, for example. My project partners and I received the ‘German Future Prize’ for our work in this field – and it has already yielded a wealth of successful applications.”

Dirk Sutter, Head of Development Group for Ultra-short Pulsed Lasers, Schramberg

… an industry sector manager

“We take a unique industry sector approach that offers you support long before you start using our lasers on your production line. For example, I can give you ideas on how to design your product to make it suitable for laser machining. I specialize in lightweight construction, helping customers from the automotive and other industries to exploit the full potential of laser technology and develop tailor-made solutions.”

Marc Kirchhoff, Industry Manager for Lightweight Construction, Ditzingen

… an application specialist

“Are you looking for an industrially viable production method? If so, our LACs are a great place to start. Based on your requirements, we can produce sample parts and find the optimum combination of lasers, components and process parameters to ensure you get the best quality at the lowest cost. Our success stems from the close relationship we have with our customers. I moved to China for my specialist field of microprocessing.”

Severin Luzius, Group Manager, Laser Application Center, Taicang
Your production. Our portfolio.

Solid-state lasers

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CO₂ lasers

- **TruFlow** 30 – 31
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## Why choose TRUMPF lasers?

1. Innovative solutions  
2. Maximum precision and quality  
3. Comprehensive range of products  
4. Global application consulting  
5. Many years of experience  
6. Industry experts  
7. High availability (remote services)  
8. On-site service  
9. Customized services

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TruDisk

01
100 % constant power
from the first millisecond

02
Robust protection
against back reflection
thanks to our patented resonator design

03
Maximum beam quality
thanks to the disk geometry

04
Modular design
for reliable and versatile operation
For highly productive cutting and welding, look no further than the TruDisk all-in-one laser. Brazing and deposition welding are two of its key strengths, and it can even handle highly reflective non-ferrous metals. The versatile TruDisk laser can be used in networks of up to six machines.

**Higher productivity**
with variable beam splitting

**More stable process results**
thanks to intelligent software options

**Resource-efficient**
with optimum availability

**Six workstations**
supplied with reliable laser power in a network
**100 % constant power**
from the first millisecond

The laser power can be regulated in real time instead of being controlled manually. So you get the best power stability on the market for the entire service life of your TruDisk laser. And that means perfectly reproducible results around the clock – even in tropical conditions.

**Robust protection against back reflection**
thanks to our patented resonator design

Your TruDisk laser can also comfortably handle highly reflective materials thanks to its patented resonator design. It offers robust and reliable performance even under extreme conditions.

**Maximum beam quality**
thanks to the disk geometry

Disk lasers offer outstanding beam quality, with the TruDisk achieving figures of 2mm-mrad and up. Delivering between 1 and 16 kW of power, TruDisk lasers produce optimum results for processes as diverse as laser welding and laser cutting. They are also a great choice for deposition welding, hardening and additive manufacturing.

**Modular design**
for versatile and reliable operation

The TruDisk features a simple, compact and modular design. That ensures maximum uptime and makes it easy to service and maintain. And if your needs change later down the line, it’s no problem to upgrade your laser power at any time or add additional fibers to serve multiple workstations from a single laser source.
Six workstations
supplied with reliable laser power in a network

Your TruDisk can serve up to 6 workstations connected together in a laser network – either simultaneously by splitting the laser beam, or one after the other. Whichever option you choose, you’ll get steady and continuous beam quality at each and every workstation, with everything you need compactly stowed under a single laser hood. So you get the most out of your laser and make optimum use of all your machines.

More stable process results
thanks to intelligent software options

The TruControl laser control system provides flexible support for all standard fieldbus systems. It also allows you to program pulse shapes tailored to your specific application. CutAssist helps you get optimum results. And the Quality Data Store lets you record all your process settings and export them.

Resource-efficient
with optimum availability

With an efficiency rate of over 30 percent and intelligent energy management, the TruDisk can help you cut your resource consumption and reduce your operating costs. TruDisk lasers are a reliable choice with no wear parts. They also feature an intelligent cooling system with a built-in heat exchanger. In many cases that eliminates the need for an external cooling solution – just one of the TruDisk’s many benefits.

Higher productivity
with variable beam splitting

We can provide you with a tailor-made beam guidance solution, enabling you to split the laser beam in whichever way you choose. For example, you could weld workpieces from above and below at the same time. By maintaining a more homogeneous distribution of energy in the workpiece, you can minimize distortion while simultaneously benefiting from higher throughput rates.

Chopping disk with a laser cladded profile.

See the TruDisk in action at the company LICOS Trucktec GmbH: www.trumpf.info/epogtw
18 TruDiode

Laser Beam Sources

TruDiode

100 % constant power
regulated in real time

> 40 % efficiency
with minimal running costs
Compact direct diode lasers are tremendously energy-efficient and produce outstanding results in applications such as deep penetration welding, heat conduction welding, deposition welding, brazing and plastic welding.

05

**Extremely compact**
and easy to maintain

04

**Flexible upgrade options**
and versatile uses

03

**Always ready for action**
throughout its service life
100 % constant power 
regulated in real time

The power of the TruDiode laser is regulated in real time and is completely independent of the laser’s environment and service life. With its high beam quality and power levels ranging from 150 to 6,000 watts, the laser guarantees optimum and reproducible workpiece results from the very first millisecond. All that at a low capital cost and with minimal running costs!

>40 % efficiency 
with minimal running costs

TruDiode lasers are extremely energy-efficient and feature very high wall-plug efficiency. The intelligent cooling system with a built-in heat exchanger often eliminates the need for an external cooling solution. You’ll be amazed by the low running costs of your direct diode laser!
03
Always ready for action
throughout its service life
Passively cooled diode modules maximize the laser’s service life. The diode cooling water is also used to cool the optics and laser light cable – a reliable, non-corroding solution. You also benefit from the wear-free properties of laser machining and a steady, constant application of energy to the workpiece.

04
Flexible upgrade options
and versatile uses
It’s easy to upgrade your TruDiode laser even after it’s been installed. For example, you can make on-site adjustments to both the laser power and the number of workstations served by the laser. And the TruDiode is just as versatile when it comes to applications, welding plastics or metals either with or without filler material.

05
Extremely compact
and easy to maintain
With its modular, space-saving design and a footprint of just one square meter, you’ll find it easy to integrate the TruDiode into your existing production systems. The modular design concept means that you can even replace some components yourself – quickly and easily!

Compact 19" version of the TruDiode 301.

Optical arrangement from a TruDiode 6006.
TruFiber

Designed for precision tasks, fiber lasers can meet your requirements for high process speeds, small kerf widths, and narrow weld seams.

01 Kerf width <100 µm in precision cutting thanks to optimum beam quality

04 Intelligence included as part of the package

02 100 % constant power throughout the laser’s entire service life

03 With CutAssist you can easily machine the toughest spots
01

Kerf width <100µm in precision cutting
thanks to optimum beam quality

A resonator made of fibers gives you optimum single-mode beam quality for high-precision contours. The typical focus diameter is between 10 and 50 µm. The beam quality produces very high power density at the workpiece, which you can use to achieve high processing speeds and productivity, especially in thin sheet applications.

02

100 % constant power
throughout the laser’s entire service life

The built-in system for actively controlling laser power ensures you get stable processes and reproducible processing results. The laser power is controlled automatically and in real time throughout your laser’s entire service life – regardless of the ambient conditions.

03

With CutAssist
you can easily machine the toughest spots

The CutAssist option is designed to help you with precision cutting and welding. It automatically adapts the laser parameters to the cutting speed, ensuring high-precision results even for sharp corners and curves without having to search for new parameters.

04

Intelligence included
as part of the package

Whether you choose the free-standing version or the 19“ housing for integration into your existing facilities, your TruFiber laser also comes with an intelligent, easy-to-use control system we call TruControl. This includes a frequency generator, pulse shaping, real-time power control, a variety of interfaces, a two-channel emergency stop circuit and software.
TruPulse

Pulsed solid-state lasers emit short, powerful bursts of light. That makes them perfect for spot and seam welding as well as cutting.

01 Versatile and easy to maintain thanks to its modular design

02 100 % constant power keeps your processes stable

03 High-precision 10 μs pulses get the job done where others fail

04 100-fold higher peak pulse power for higher productivity

05 Welding know-how built in
Versatile and easy to maintain thanks to its modular design

The TruPulse portfolio features a wide range of products – and whichever model you choose can be tailored precisely to your manufacturing environment. Thanks to the modular design of the TruPulse system, all its components can be repaired or replaced on site should the need arise. Equipped with up to six laser fibers, the versatile TruPulse can serve one or more processing stations at a time through energy or time sharing configurations.

High-precision 10 μs pulses get the job done where others fail

With a pulse rate of 10 μs, the laser can closely match the actual pulse shape to the desired pulse shape. That means you always get the graphically programmed shape combined with superior pulse-to-pulse stability. A pulse power of several kilowatts for a few milliseconds makes welding and cutting possible in situations that are beyond the scope of other methods.

100-fold higher peak pulse power for higher productivity

The burst function operates like a dam: the system ‘stores up’ power and then releases it, briefly exceeding the average power many times over. That yields a 100-fold higher peak pulse power. The resulting laser pulse reduces the cycle time, making your work far more productive. In many cases you only need a laser with low average power, which means even more savings.

100 % constant power keeps your processes stable

Real-time power control ensures that the output power reaching the workpiece matches your settings perfectly. That creates stable processes and reproducible results over the entire service life of your laser – regardless of the ambient conditions. And that makes the TruPulse the perfect tool for even the trickiest applications.

Welding know-how built in

The WeldAssist option recommends the best settings for the welding parameters, pulse shape and focus position depending on the material, thickness and weld depth. That reduces the time required to set up each new application. What’s more, the system can store the parameters so that you can use exactly the same weld settings in the future.

Watch the TruPulse laser perform spot and seam welding:
www.trumpf.info/1ugirk
TruMicro

Whether you need them for patterning, ablating, cutting or drilling, industry-proven short and ultra-short pulsed lasers are a great addition to your micro-production facilities.

100% customized pulses

Endless opportunities

The all-rounder with a cool head

Laser power put to the very best use

Integration made easy
100 %
customized pulses

Smart work: the ultrafast power modulator keeps the power and pulse energy at exactly the required level, regardless of any external influences. Thanks to the combination of pulse picking and precise control of the pulse energy and intensity, you can always be confident of getting exactly the pulse you need. And when it comes to industrial applications, that means you get optimum results around the clock for even the most complex tasks.

The TruMicro 5000 features high-precision pulse control – perfect for cleanly cutting a hole in a circuit board.

The all-rounder
with a cool head

The energy-rich, ultra-short laser pulses vaporise the material the moment they hit the workpiece. So the material doesn’t heat up unless you specifically choose a targeted zone to heat. This ‘cold processing’ technique allows you to use lasers on temperature-sensitive materials and cut delicate patterns in whichever shape you choose.

With TruMicro you can make the impossible possible!

Its high peak intensities allow you to machine brittle and transparent materials.

Integration
made easy

TruMicro lasers are designed to integrate easily into your current setup. Compatible with all standard interfaces and bus systems, they slot neatly into your existing production environment. The laser light is guided safely to the workpiece by our special range of beam guidance components and optics that are optimized for the peak intensities of ultra-short pulsed laser technology. Older models can be replaced by new lasers while still maintaining full compatibility.

Laser power
put to the very best use

Regenerative disk technology ensures that 100% of the average power output makes its way into each individual pulse. The disk geometry keeps the high beam quality stable, the intensity distribution at the workpiece remains constant, and the pulse duration is independent of the repetition rate. All this guarantees optimum processing results. In addition, all TRUMPF ultra-short pulsed lasers feature multi-pulse capabilities.

Endless
opportunities

Tap into the ‘Power of Choice’ to get a solution that is precisely tailored to your needs. The TruMicro Series of lasers ranges from economical entry-level lasers to highly productive nanosecond, picosecond and femtosecond lasers with high average output for industrial-scale production. The lasers are available in all wavelengths from infrared to green and ultraviolet.

Watch the TruMicro in action:
www.trumpf.info/03hfic
TruMark

TruMark lasers make it faster and easier than ever to achieve perfect marking results. They can create customized, permanent, high-quality markings on virtually any material.

01 The freedom to choose each and every time

02 Simple integration and automation thanks to a broad range of functions

03 Intuitive operation through innovative solutions

04 Intelligent software gives you all the support you need
**The freedom to choose**

Each and every time

Whatever material you need to mark – and however fast you need the marking process to be – the TruMark range of products has the right solution in every power class. Depending on your application you may need a fiber laser with high average power or a rod laser with high peak pulse output. TruMark lasers are easy to integrate into your existing facilities and are available at all wavelengths from infrared to green and ultraviolet.

**Easy integration and automation**

Thanks to a broad range of functions

Whether you’re looking to integrate a laser into your production line or install a laser workstation in a stand-alone capacity, TruMark offers you everything you need. Simply choose the optimum solution for your manufacturing environment from a wide range of models, interfaces and software options. We can cater to everything from a single part to mass production – and we’re always on hand to give you the advice you need.

**Intuitive operation**

Through innovative solutions

TruMark lasers can be used quickly, easily and safely even by less experienced users. That’s because they come with intuitive software and innovative solutions for setting up your processes, including pilot laser, focus finder, navigator and observer functions. These features offer a flexible, productive and cost-effective way to produce high-quality products.

**Intelligent software**

Gives you all the support you need

The Module Interface (MI) software connects the marking software to user-specific databases or measurement and control systems. It also processes and coordinates the management of marking jobs, saving time on the transitions between orders – especially in the case of short production runs. The software can also be adapted to your specific needs by customizing its functions and user interface.

**See the TruMark in action:**

www.trumpf.info/6mpr9y

A laser marked circuit breaker.

The TruMark 5010 is a compact, all-in-one solution.

The Observer ensures the marking is perfectly aligned on the work-piece.

Single-point lubricating system marked using the Module Interface (MI) software.
TruFlow

Reliable and robust: CO₂ flow lasers offer an all-round solution for cutting and welding a wide range of materials.

01

Maximum stability thanks to its compact, square design

02

20% energy savings thanks to cooling and energy management concepts

03

Minimal wear thanks to superior technology

04

Integrated beam guidance for perfectly aligned laser light

05

Reliable laser operation thanks to continuous monitoring of the mirror
01 **Maximum stability**
thanks to its compact, square design

Every TruFlow resonator undergoes its basic lifetime calibration in the clean room. The resonator’s key components are water-cooled, and its compact, square design makes it extremely robust. It is not affected by changes in the ambient temperature. All of the parameters remain constant even at high laser powers – and no other system can match the stability of the TruFlow’s beam output angle.

![The stable resonator can even be installed on moving gantries.](image)

02 **20% energy savings**
thanks to cooling and energy management concepts

The new and improved cooling system in your TruFlow reduces energy consumption by up to 20% and makes the TRUMPF CO₂ laser one of the most energy-efficient machines in its class. This is boosted even further by the TruFlow’s intelligent energy management system.

![A truck axle welded with a CO₂ laser.](image)

03 **Minimal wear**
thanks to superior technology

The TruFlow uses a wear-free system of gas circulation and radio-frequency excitation. The magnetically suspended turbo blowers ensure that no damage is caused by power outages or emergency shutdowns. Take advantage of the decades of development that have gone into this all-round laser machining solution.

04 **Integrated beam guidance**
for perfectly aligned laser light

The fully encapsulated built-in beam guidance system that comes with your TruFlow prevents any accumulation of dirt that could cause the laser power to drop and the focus geometry to fluctuate. Additional functions for beam widening, pilot laser and circular polarization are safely and compactly stowed under the hood of the laser machine.

![Laser tube welding is also possible thanks to optimized beam guidance and beam shaping.](image)

05 **Reliable laser operation**
thanks to continuous monitoring of the mirror

The output mirror is one of the most highly stressed components of your laser. That’s why the TruFlow continuously monitors the mirror to check its temperature and detect any contamination. That keeps your laser working smoothly.

![A truck axle welded with a CO₂ laser.](image)

Watch the TruFlow laser cutting stainless steel: [www.trumpf.info/jdlaqx](http://www.trumpf.info/jdlaqx)
TruCoax diffusion-cooled lasers are lightweight, robust and virtually maintenance-free. With their high beam quality and process stability, they are the perfect choice for cutting and perforating non-metallic materials.

01 The best power stability on the market thanks to wear-free technology
02 Top-tier features included as standard
03 Small, compact and easy to integrate
04 Stable pulses and high peak pulse power for optimum machining results
The best power stability on the market thanks to wear-free technology

The TruCoax delivers reliable laser power year after year. A best-in-class choice in terms of power stability and maintenance, the TruCoax offers years of consistent, reliable laser power and stable processes without ever needing to replace the built-in cylinder of premixed gas. That’s a major advantage over conventional sealed-off CO₂ lasers. The use of transistor-based excitation eliminates the need for wear parts such as tubes. And there is no need to fully overhaul the system at any point.

In contrast to a typical sealed-off laser, the laser power of the TruCoax remains constant over many years thanks to the built-in cylinder of premixed gas.

Top-tier features included as standard

The functions and safety features included as standard with the TruCoax are tough to beat. Its pilot laser simulates the laser beam, making it easier to position the workpiece. The compressed air filter units and the two-channel shutter ensure robust laser performance in everyday industrial operation.

Stable pulses and high peak pulse power for optimum machining results

The power and the beam position of the TruCoax remain extraordinarily stable from one pulse to the next. So you can be assured of getting superbly accurate results. It also features constant peak pulse power regardless of the repetition rate – and this peak pulse power is enormously high, which maximizes your process speeds.

Small, compact and easy to integrate

The TruCoax laser is extremely compact thanks in part to the stable design of the resonator and the transistor-based excitation integrated into the laser head. The laser’s power supply components come in a handy 19-inch format, which means they can be housed in your existing switch cabinet.

Comparing the size of the TruCoax with that of a typical high-power slab laser shows just how compact it is.

Watch the TruCoax at work in non-metal applications: www.trumpf.info/dna0oc

A resonator from a TruCoax.

A laser cut pipe connection piece.
Programmable focusing optics

The processing optics are often the most critical factor when it comes to applying laser technology in your production environment. Programmable focusing optics (PFO) from TRUMPF offer a number of advantages.

01 **Fast and accurate** thanks to dynamic motor control

02 **On-the-fly capabilities** through real-time synchronization of the scanner and robot

03 **A broad choice** for any application

04 **Process reliability** A control loop between the laser, PFO and sensors

05 **Intuitive operation** via the PFO SmartTeach app
**01**

**Fast and accurate**
thanks to dynamic motor control

The use of cutting-edge digital motors within the PFO guarantees fast and accurate machining results.

---

**02**

**On-the-fly capabilities**
through real-time synchronization of the scanner and robot

Intelligent, real-time synchronization of the robot, laser and PFO ensures precise positioning of the laser beam – that’s welding on-the-fly at its best!

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**03**

**A broad choice**
for any application

The PFO portfolio includes focusing optics for any applications that use low-power or high-power lasers from the first to the third dimension, with up to 8 kW in cw mode and significantly higher output powers in pulsed operation. Individual optics are optimized for specific applications. For example, the PFO 1D is optimized for wobble. The ability to specifically adjust the wobble movement leads to optimum weld seam quality.

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**04**

**Process reliability**
A control loop between the laser, PFO and sensors

The programmable focusing optics can optionally be equipped with interfaces for TRUMPF sensor technology solutions such as CalibrationLine and VisionLine. CalibrationLine calibrates the beam position and laser power at the workpiece, while VisionLine detects the position of the workpiece and corrects the beam path. This interaction between the laser, PFO and sensor system makes it possible to adjust your processes in real time, significantly boosting process reliability. External process sensors can also be connected up to the PFO.

---

**05**

**Intuitive operation**
via the PFO SmartTeach app

You can use the PFO SmartTeach app to set up your laser welding and cutting programs quickly and intuitively using a mobile device. The camera mounted on the PFO transmits a live image directly to the app, and the app synchronizes your new or modified programs directly with the laser.

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**Intuitive operation**

The PFO SmartTeach app is available from the Apple App Store. Users of the TruControl software will quickly feel at home with the familiar features.

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You can tailor the wobble geometry to meet your specific needs.

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Watch the **PFO 1D** in action:
[www.trumpf.info/c81dxh](http://www.trumpf.info/c81dxh)
Focusing Optics

Whether you’re welding, cutting or drilling, TRUMPF has the right processing optics to meet your needs. Thanks to their modular design, TRUMPF optics can be tailored to your exact requirements.

01
The perfect optics every time thanks to modular components

02
Perfect seams on all sides

03
Robust and reliable in everyday industrial settings

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Intelligent monitoring Keeping an eye on your process media

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Easy to integrate into your machining lines
01

**The perfect optics every time**

thanks to modular components

Up to 16 kW of output power for a focus diameter of just 10 µm – you can be sure of getting optimum results with the right optics. Plenty of different options are available to ensure you find the best solution for every job, from right-angled optics to bifocal versions. TRUMPF also offers special optics for deposition welding with powder feed and for linear laser spots.

02

**Perfect seams**

on all sides

The combination of top-quality lenses and protective glass monitoring ensures minimal focus shift and homogeneous welding results. Crossjet – a jet of gas that runs from one side to another in front of the lens protection module – also protects the lenses from contamination; while the patented metal vapor effect nozzle produces more stable welds. That ultimately makes for perfect seams on both sides of the weld.

03

**Robust and reliable**

in everyday industrial settings

More than 10,000 focusing optics systems from TRUMPF are in industrial use worldwide – and customers rely on them to do a reliable job year after year. Offering an impressively long service life, they are highly robust and resilient against back reflections.

04

**Intelligent monitoring**

Keeping an eye on your process media

Setting limit values for your shielding gas or compressed air is simple, and it’s equally easy to monitor them. An optional cartridge module offers additional peace of mind. And of course you always have access to the TRUMPF remote service to tackle any issues from the laser right down to the workpiece.

05

**Easy to integrate**

into your machining lines

The modular system and optional components can be used to create a range of different configurations. So you get processing optics that are perfectly tailored to your machining environment and your specific needs.

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BEO D70 processing optics with motorized swivel mount integrated in the TruLaser Station 5005.

Watch the CFO in action: www.trumpf.info/skdw1p

Laser Beam Sources

Components 37
Sensors

Stable processes are essential for efficient and cost-effective laser manufacturing. That’s why you need sensors to monitor every aspect of your process without interrupting it. That saves time and gives you the reassurance of a reliable production process.
**SeamLine Pro**

monitors your entire welding process

SeamLine Pro continuously collects data on your welding process before, during and after welding and automatically moves the focus point to the desired weld position. That gives you perfectly reproducible results.

**VisionLine**

for simple position sensing

VisionLine visually monitors your processes and ensures that they always take place in exactly the right spot. The image processing sensor system automatically recognizes features such as edges and holes, helping to boost the process capabilities of your production line.

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Discover how **SeamLine Pro** boosts productivity: www.trumpf.info/y2hesk

Discover how **VisionLine** ensures accurate cutting: www.trumpf.info/60ewg
**CalibrationLine**
controls the focus position and laser power

The CalibrationLine sensor system checks at regular intervals whether the focus position and laser power at the workpiece correspond to the stipulated laser control parameters. CalibrationLine corrects the measured values as necessary to ensure the real-life process matches the program, helping to achieve perfect welding results.

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**Focus**
Focus sensor for positioning the laser beam on the workpiece.

**Laser power**
Sensor for measuring laser power.

**Positioning the programmable focusing optics above the sensor.**

**Measuring and calibrating the X, Y and Z position.**

**Power output in W**

<table>
<thead>
<tr>
<th>Power output in W</th>
<th>Laser</th>
<th>Workpiece</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,000</td>
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<tr>
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<td>3,600</td>
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</tbody>
</table>

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Learn more about precise power control with **CalibrationLine**: www.trumpf.info/xs6mg

Discover how **CalibrationLine** controls the focus setting: www.trumpf.info/zr7j9b
Pyrometer temperature control
monitors the temperature when welding plastics

The pyrometer ensures that your plastic is welded at an optimum temperature. It controls the laser power output to maintain a constant temperature at the workpiece. That gives you highly accurate, reproducible results.

Mounted on the PFO, the pyrometer measures the temperature at the surface of the weld seam.

With temperature control you can easily reproduce weld seams of the same thickness.

Remote services
increase your laser’s availability

TRUMPF remote services maximize laser uptime. With your permission, TRUMPF maintenance experts can check the status of your solid-state laser via secure remote access in the event of a malfunction and actively adjust the settings. In many cases that means production can continue without requiring a service call-out, which keeps laser downtime to a minimum.

Temporary changes to limit values can enable production to continue.

A replacement part is dispatched at the same time as adjusting the limit values.

Discover how TRUMPF Remote Services maximize your laser’s availability: www.trumpf.info/zw0rg
Integration

TRUMPF solid-state lasers for welding, cutting and microprocessing include interfaces to all standard fieldbus systems, making it easy to integrate them into your production line. What’s more, TruControl offers you a range of additional options to ensure the perfect control of your production environment.

01 Save energy with intelligent energy management
02 Save your quality data to the Quality Data Store
03 A variety of interfaces makes for easy integration
04 Perfect cutting and welding even in the toughest spots
Save energy
with intelligent energy management

TRUMPF lasers are renowned for their outstanding energy efficiency. And you can cut energy consumption even more during idle periods thanks to a choice of four different programmable sleep modes, which gradually scale down the laser’s power consumption. TRUMPF lasers can also communicate in the intelligent PROFienergy network.

Save your quality data
to the Quality Data Store

The Quality Data Store software module allows you to select relevant laser and processing optics parameters and archive or export them during the laser process. Using unique data such as part numbers and shift information, you can allocate precise laser parameters to each component, even after the process has finished.

A variety of interfaces
makes for easy integration

Interfaces are the key when it comes to integrating a laser into a machine or production line. That’s why TRUMPF solid-state lasers come with interfaces to all standard fieldbus systems. The processes are controlled in real time. The TruControl system manages, controls and visualizes the interface assignment. Users benefit from a standardized control architecture that is compatible with all laser technologies.

Perfect cutting and welding
even in the toughest spots

If the machine’s advance rate changes (e.g. reduced velocity at the corners of a contour) you can use the software module to automatically scale down the laser output power in line with defined parameters. The processing mode can also be automatically tailored to the velocity, for example by switching from cw mode to pulse operation for sharp corners. That keeps the line energy constant, giving you perfect machining results.
TruServices: Your production. Our services.

TRUMPF offers a range of services to meet your individual requirements throughout your laser’s life cycle. All over the world, our services help you get the best availability out of your laser to make your manufacturing facilities even more productive.

- **Planning**
  We can visit your facility to help you ensure everything is in place to install your laser and achieve a smooth ramp-up.

- **Application consulting**
  Put your trust in our application consulting service. We can help you optimize your programs and laser parameters to gain a real boost in productivity and quality.

- **Set-up**
  After you’ve purchased your laser we can help you install it and bring it online. We can also train your employees and help get your production process up and running.

- **Maintenance**
  Regular servicing by our technical service team is the best way to keep your laser working perfectly and maximize its availability.

- **Service**
  Regular servicing by our technical service team is the best way to keep your laser working perfectly and maximize its availability.
Feature upgrades
Your laser can keep pace with your changing requirements thanks to its modular design and our software updates. It’s easy to add new functions and upgrade existing features.

Spare parts service
With replacement parts perfectly tailored to our laser machines and outstandingly efficient logistics, the TRUMPF spare parts service maximizes the availability of your laser.

On-site troubleshooting
Even if something unexpected goes wrong, our superbly trained service engineers will be with you in no time—helping you keep non-productive time to a minimum.

Relocation or resale
If you need to relocate your TRUMPF laser, we can help. And if you are looking to sell your laser, our Resale Center associates will be more than happy to provide assistance.

Training
Are you looking to train up your machine operators and maintenance personnel? Or do you need some advice on specialist applications? Whatever the case, we can help at our dedicated training centers or arrange a personalized training session at your location.

Service agreements
Our service agreements are designed to provide exactly the level of service you need—from remote services and preventive maintenance by the vendor to discounted servicing or even full service agreements including spare parts. All our service agreements feature modular service components that can be individually combined to create exactly the package you want.
Your goals. Our company.

With TRUMPF you get everything from a single source – and not just when it comes to laser technology. We also offer everything else you need for a modern production environment that meets your company’s current and future goals.

**Industry 4.0 – Solutions for your future**

The ability to combine innovation with proximity to our customers is something that defines our company – especially when it comes to developing innovative solutions in the context of Industry 4.0. With the right tools you, too, can embrace the fourth industrial revolution in your production environment and secure an international competitive edge. We can make your manufacturing processes more flexible, more efficient and more transparent, helping you to make the best use of available resources and boost your overall productivity. Open interfaces and intelligent sensor systems have already opened the doors to continuous status assessments, remote access and quality data storage – and you can tap into these techniques to boost the availability of your production facilities and guarantee the traceability of the parts you produce. Laser marking turns the parts themselves into data media that can easily be connected to higher-level cloud solutions.

**Innovations for your production line**

TRUMPF is renowned for its innovative capabilities. We are constantly pushing ahead with research and development with a key focus on the future of production and manufacturing engineering, laser technology and materials processing. We transform ideas and visions into viable products which offer major benefits to our customers.
Lasers for manufacturing

From cutting, welding and marking to surface processing and additive manufacturing – we have the right laser and the right technology to achieve innovative and cost-effective production in any industrial application. Whether we’re working on a macro, micro or nano scale, we’re responsive to our customers’ needs and skilled in providing them with appropriate system solutions, application know-how, and consulting services.

Power supply systems for high-tech processes

Advanced technology would be unthinkable without process power supply systems. That holds true for everything from semiconductor manufacturing to solar cell production. Our MF and RF generators supply electrical power for induction heating, plasma and laser excitation at a clearly defined frequency and output, with high levels of reliability and repeatability.

Machine tools for flexible sheet metal and pipe work

We provide our customers with tailor-made machines and automation solutions, advice, software and services – in fact everything they need to reliably create high-quality products. From laser cutting and punching to bending and laser welding, our customers machine the sheet metal and pipe components that are required in all areas of our daily lives, including industry, household, communication and transport applications.