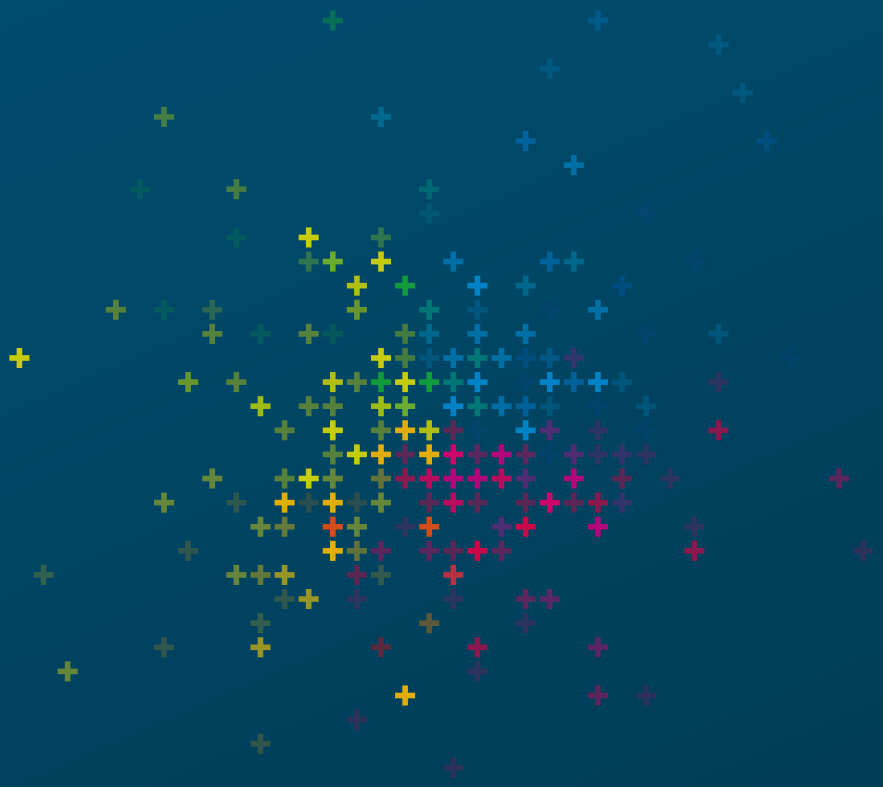
GF Machining Solutions

Academy training

Passion for Precision

GF Machining Solutions: all about you

When all you need is everything, it's good to know that there is one company that you can count on to deliver complete solutions and services. From world-class electrical discharge machines (EDM), Laser texturing and Additive Manufacturing through to first-class Milling and Spindles, Tooling, Automation and software systems — all backed by unrivalled customer service and support — we, through our AgieCharmilles, Microlution, Mikron Mill, Liechti, Step-Tec and System 3R technologies, help you raise your game and increase your competitive edge.



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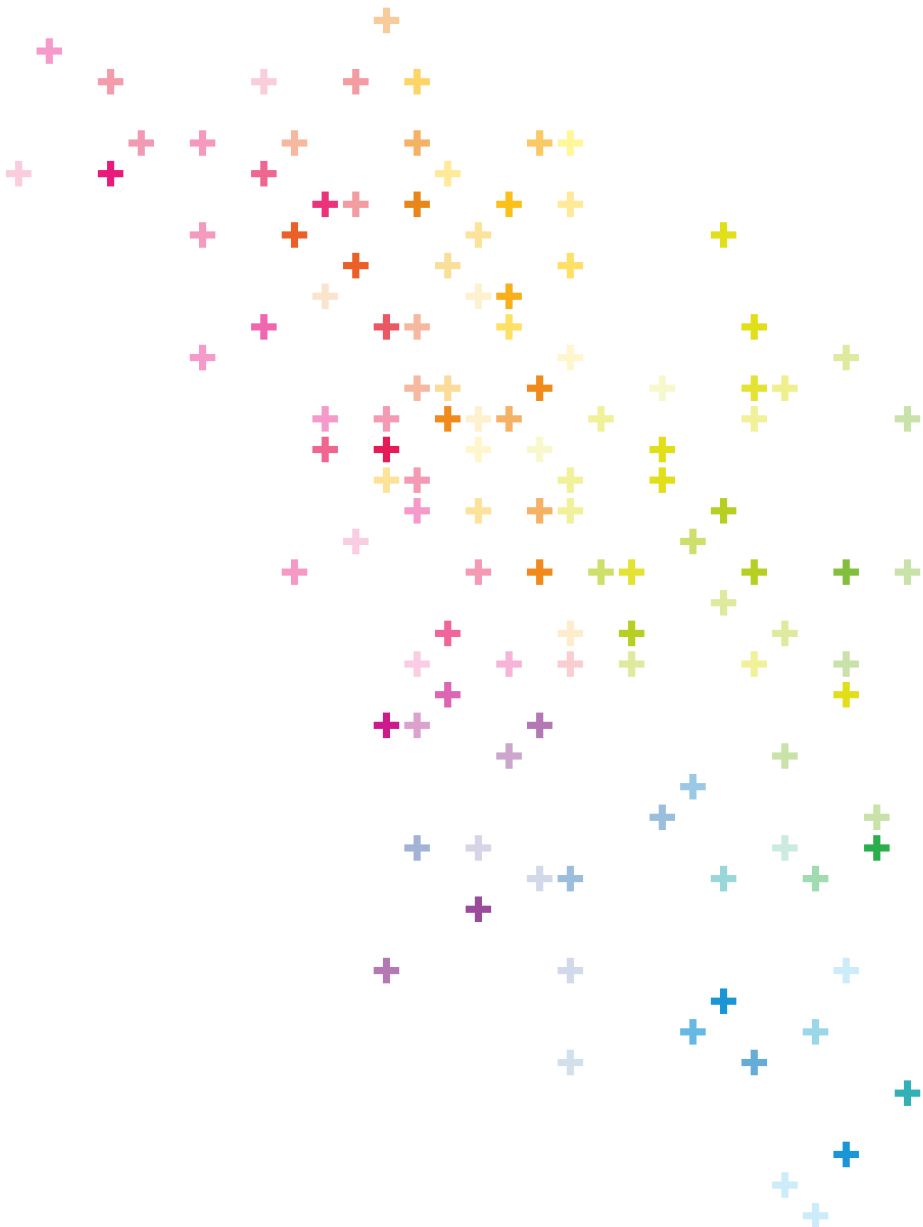


ACADEMY
Passion for Education

Learn to operate

We provide you with indepth training to share with you the basic knowledge to use your new machine autonomously/independendtly.

Milling

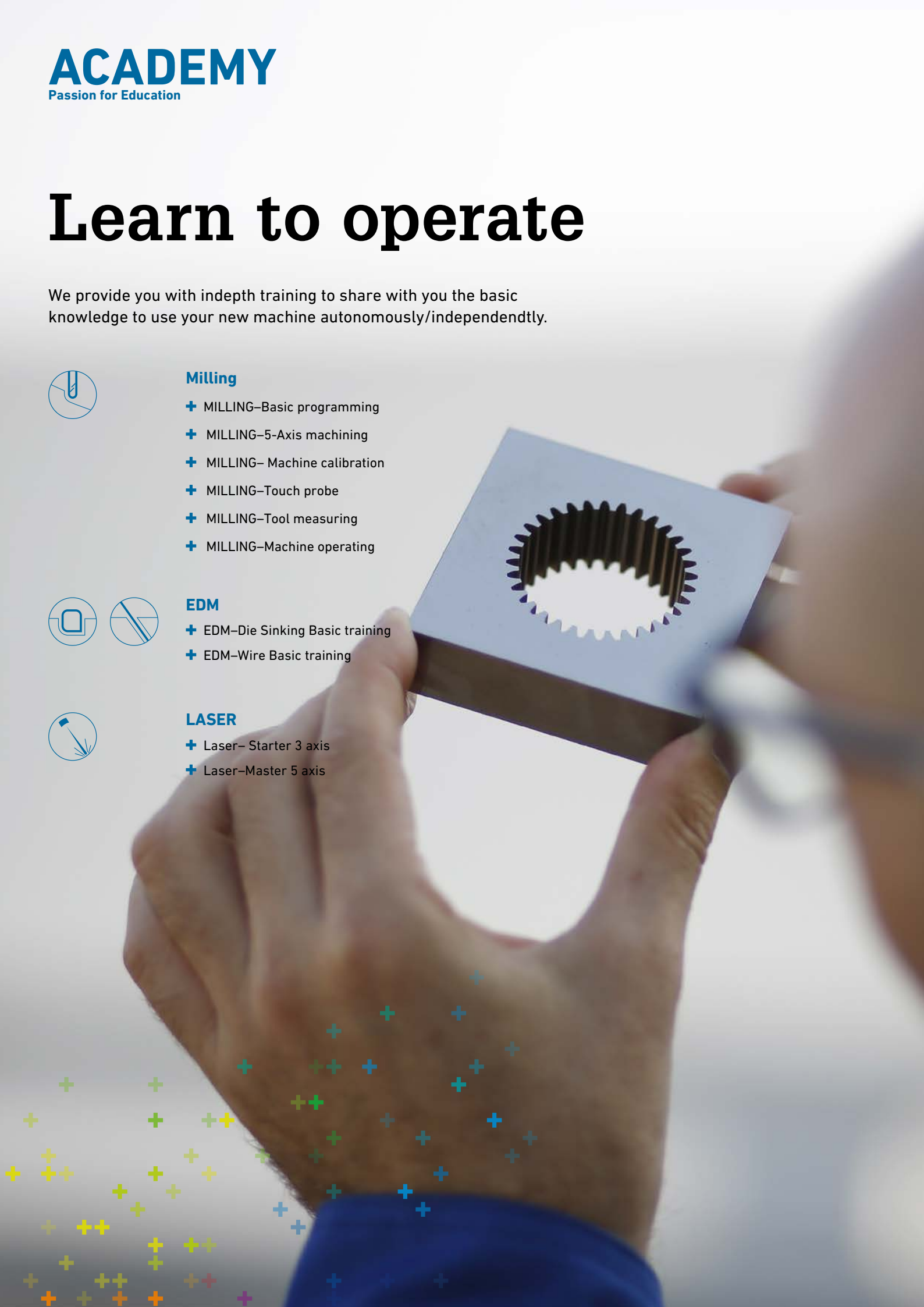
- MILLING–Basic programming
- MILLING–5-Axis machining
- MILLING– Machine calibration
- MILLING–Touch probe
- MILLING–Tool measuring
- MILLING–Machine operating

EDM

- EDM–Die Sinking Basic training
- EDM–Wire Basic training

LASER

- Laser– Starter 3 axis
- Laser–Master 5 axis



Learn to operate training

MILLING
Basic programming

article n°200010425 (at GF site)
article n°200010426 (at customer site)

Duration	Number of participants	Experience level	Requirements	Machines
4 days	4	Beginner	Knowledge of Milling and principles of CNC	Programming workstations and any GF Machining Solutions CNC Milling machine

Get familiar with iTNC530/ TNC640 contouring computer numerical controls (CNCs)

What are the course contents?

- Create and test programs from drawings with HEIDENHAIN iTNC530 conversational programming
- Understand the structure of Milling machines and their specific functions

What is the course objective?

- Learn how to program

What are the course benefits?

- Use iTNC530, TNC640 or TNC620
- Become autonomous on basic use with the machine
- Create and test programs in HEIDENHAIN conversational programming based on workpiece drawings

Learn to operate training

MILLING
5-Axis machining

article n°200010429 (at GF site)
article n°200010430 (at customer site)

Duration	Number of participants	Experience level	Requirements	Machines
3.5 days	4	Beginner	Basic programming course	MProgramming workstations and any GF Machining Solutions 5-axis Milling machine

Reduce production costs with your 5-axis Milling machine

What are the course contents?

- Work with rotary axes and spatial angles
- Distinguish between the different numerical control (NC) program types of the TNC as well as the different TCPM functions (inclined and simultaneous machining) and use them
- Use functions to influence the program execution behavior of the CNC control or to adjust NC programs
- Apply the function for tilting the working plane for swivel heads or tilting tables

What is the course objective?

- Produce complex five-axis parts with maximum flexibility and minimum tolerances to reduce production costs.

What are the course benefits?

- Become autonomous on the machine
- Maximize productivity through basic parameters
- Optimize your use of consumables
- Eliminate the risk of collision
- Apply the function for tilting the working plane for swivel heads or tilting tables
- Work with rotary axes and spatial angles
- Distinguish the different NC program types of the TNC

Learn to operate training

MILLING
Machine calibration

article n°200010761 (at GF site)
article n°200010762 (at customer site)

Duration	Number of participants	Experience level	Requirements	Machines
2 days	4	Intermediate	Basic programming course	MILL E, HEM - MILL S/X, HSM - MILL P, HPM

Reach a higher measuring precision

What are the course contents?

- iTNC530 or TNC640
- Why geometry calibration is important
- Verification of automatic machine calibration (AMC)
- Definition of AMC and how to operate (3-axis)
- Definition of intelligent kinematic calibration (IKC) and how to operate (5-axis simultaneous)
- Alignment and calibration of 5-axis simultaneous machine

What is the course objective?

- Improving the accuracy of your Milling machine

What are the course benefits?

- Become autonomous in calibrating a Milling machine
- Guarantee your machining accuracy
- Master machining repeatability over time
- Repeat the process easily to ensure a high-precision quality

Learn to operate training

MILLING
Touch probe

article n°200010769 (at GF site)
article n°200010770 (at customer site)

Milling

Duration	Number of participants	Experience level	Requirements	Machines
1 day	4	Intermediate	Basic programming course	MILL E, HEM - MILL S/X, HSM - MILL P, HPM

Measure with maximum flexibility

What are the course contents?

- iTNC530 or TNC640
- Touch probe
- Manual and automatic presetting
- Manual and automatic alignment
- Manual and automatic measurement
- Rework after measurement

What is the course objective?

- Learn how to handle the touch probe efficiently

What are the course benefits?

- Use the touch probe cycles in manual and automatic operation
- Log the measured values

Learn to operate training

MILLING
Tool measuring

article n°200010773 (at GF site)
article n°200010774 (at customer site)

Duration	Number of participants	Experience level	Requirements	Machines
1 day	4	Intermediate	Basic programming course	MILL P, HPM - MILL S/X, HSM

Maximize use of cutting tool while preserving parts quality with your Milling machine

What are the course contents?

- Use iTNC530 or TNC640
- Calibrate a laser measuring system
- Use measurement cycle tools
- Manage broken or used tools

What is the course objective?

- Use the tool measurement cycles in the correct and efficient way

What are the course benefits?

- Eliminate rejected part
- Optimize consumption of cutting tools to reduce costs
- Reduce costs by optimizing consumption of cutting tool
- Reduce repetitive operator's tasks
- Increase operating time for other tasks

Learn to operate training

MILLING
Machine operating

article n°200010775 (at GF site)
article n°200010776 (at customer site)

Duration	Number of participants	Experience level	Requirements	Machines
1 day	4	Intermediate	Basic programming course	Related to the purchased machine

Get all of the knowledge necessary to become immediately productive with your machine

What are the course contents?

- Understand the main system, components and machine
- Optimize peripheral modules (chip conveyor, cooling unit, tool changer etc..)
- Perform daily maintenance
- Manage basic troubleshooting

What is the course objective?

- Learn to use the main components of your machine, including the different applications and outcome

What are the course benefits?

- Save time due to the optimization of the peripheral modules
- Reduce cost by saving consumables
- Reduce intervention time and cost for basic troubleshooting

Learn to operate training

EDM–Die Sinking Basic training

article n°200010301 (at GF site)
article n°200010302 (at customer site)

Die sinking

Duration	Number of participants	Experience level	Requirements	Machines
3 days	4	Beginner	Basic mechanical skills	DRILL 20, FORM , FORM E, FORM P, FORM S, FORM X

Learn the main functionalities to achieve top Die Sinking performance

What are the course contents?

- Understanding the EDM process
- Mastering the HMI:
- Navigating through the different screens
- Machine language
- Learning how to write a machining program
- Optimum machine settings method
- Preparing the machine and its environment
- Temperature control and dielectric quality
- Verification of control points
- References and position of workpieces
- Learning and using machining parameters
- Machine maintenance

What is the course objective?

- In this course, participants learn how to make their first workpieces on a die-sinking EDM machine and work unassisted.

What are the course benefits?

- Learn the main functionalities to perform with the Die Sinking technology

Learn to operate training

EDM- Wire Basic training

article n°200010361 (at GF site)
article n°200010362 (at customer site)

Wire cutting

Duration	Number of participants	Experience level	Requirements	Machines
3 days	4	Beginner	Basic mechanical skills	AC Progress, CUT E, CUT P, CUT P Pro, CUT X 000

Face every precision and part production challenges perfectly with the Wire technology

What are the course contents?

- Understanding the EDM process
- Mastering the HMI:
- Navigating through the different screens
- Machine language: Command (CMD), ISO
- Write a machine tooling program using the Expert tool
- Machine settings:
- Preparing the machine and its environment
- Wire tension and stability
- Position and alignment of guides
- Threading positions
- Verification of control points
- References and position of workpieces
- Learning and using machining parameters
- Machine maintenance

What is the course objective?

- In this course, participants learn how to make their first workpieces on a wire EDM machine and work unassisted.

What are the course benefits?

- Learn the main functionalities to perform with the EDM Wire technology

Learn to operate training

LASER Starter 3 axis

article n°200010481 (at GF site)
article n°200010482 (at customer site)

Laser

Duration	Number of participants	Experience level	Requirements	Machines
4 days	4	Beginner	Basic skills on Rhino CAD/CAM software	LASER P 400 U, LASER P 600/1000/1200 U, LASER P 4000 U, LASER S 1000/1200 U

Enter efficiently in the world of digital training

What are the course contents?

- Specifications of the Laser process
- Security
- First machining approach
- Laser Marking Control System (LMCS) human-machine interface (HMI) and programming software overview
- Three axis-mode systems and machining coordination
- Machining capability and its options
- Basic maintenance

What is the course objective?

- To learn how to use productively your Laser machine

What are the course benefits?

- Become autonomous with use of basic three-axis machine
- Able to select the right parameters according to the job
- Capable of following the basic intructions to achieve the best precision
- Can manage the basic maintenance of the machine

Maximize performance training

LASER Master 5 axis

article n°200010485 (at GF site)
article n°200010486 (at customer site)

Laser

Duration	Number of participants	Experience level	Requirements	Machines
4 days	4	Beginner	LASER-Starter	LASER P 400 U, LASER P 600/1000/1200 U, LASER P 4000 U, LASER S 1000/1200 U

Master texturing, structuring, engraving on the most complex 3D surfaces

What are the course contents?

- Specifications of Laser process in five-axis mode
- Systems coordination and Laser head movements
- Laser Marking Control System (LMCS) human-machine interface (HMI) and programming software overview
- Digitalization of the workpiece and shape preprocessing with meshed structure
- Editing for texture image and mapping for machining complex parts
- Machining capabilities and its options

What is the course objective?

- Machinig with precision on 3D complex surfaces

What are the course benefits?

- Become autonomous with use of basic five-axis machine
- Be able to select the right parameters according to the job
- Be capable of following the basic intructions to achieve the best precision

ACADEMY
Passion for Education

Maximize performance

Developing your knowledge to an expert level, to enhance your machine performances.

Milling

- Milling– Delta training iTNC530 to TNC640
- MILLING–Advanced programming

EDM

- EDM–Die Sinking Contouring
- EDM–Die Sinking Macro programming 1
- EDM–Die Sinking Macro programming 2
- EDM–Die Sinking Smart tool 1
- EDM–Die Sinking Smart tool 2
- EDM–Wire Advanced training
- EDM–Wire Thin wires
- EDM–Wire Advanced programming
- EDM–Wire Taper-Expert

Maximize performance training

MILLING
Delta training iTNC530 to TNC640

article n°200010779 (at GF site)
article n°200010780 (at customer site)

Milling

Duration	Number of participants	Experience level	Requirements	Machines
1 day	4	Intermediate	Basic programming course	Any 5-axis machine with TNC640

Be immediately efficient with your new TNC640

What are the course contents?

- Basic Knowledge
- New cycles (Face Milling Cycle 233 and more)
- New, faster and more powerful simulation of material removal
- Work with the preset table
- New probing functions
- New TNC functions
- Comparison between iTNC530 and TNC640 controls

What is the course objective?

- Discover the differences between iTNC530 and TCN640

What are the course benefits?

- Become familiar with the special features and functions of the TNC640 and be able to use them

Maximize performance training

MILLING
Advanced programming

article n°200010781 (at GF site)
article n°200010782 (at customer site)

Milling

Duration	Number of participants	Experience level	Requirements	Machines
2 days	4	Confirmed	Basic programming 5-axis machining	MILL P, HPM - MILL S/X, HSM

Make yourself a Milling expert

What are the course contents?

- iTNC530 or TNC640 or TNC620
- Logical operations (If...then)
- Conditional and unconditional jumps
- Branching in programs and outside of the program
- Program section repeats
- Nesting techniques
- Milling cycles for contours and technical curves (e.g., ellipses, spirals)
- Letter engraving program

What is the course objective?

- Learn additional and specific knowledge to become a Milling expert

What are the course benefits?

- Create cycle-type machining sequences
- Program Milling operations of plane curves with mathematical functions
- Combination of Q parameters and HEIDENHAIN cycles
- Use the functions FN 16, 17, 18, etc...
- Manage and automate complex part measures
- Save preparation time by automation of complex measurement
- Allow traceability of machining information

Maximize performance training

EDM–Die Sinking Contouring

article n°200010601 (at GF site)
article n°200010602 (at customer site)

Die sinking

Duration	Number of participants	Experience level	Requirements	Machines
2 days	4	Intermediate	EDM–Die Sinking Basic training	DRILL 20, FORM , FORM E, FORM P, FORM S, FORM X

Maximize performance with EDM Die-sinking contouring process

What are the course contents?

- Explanation of the contouring process
- Introduction to contouring programming language
- Configuration of the machine
- Selection of type of electrode according to workpiece
- Alignment of electrodes
- Creation of a complete example
- Creation of contouring entry and exit points
- Simulation of programs before machining

What is the course objective?

- In this course, participants learn how to make complex contours inside workpieces.

What are the course benefits?

- Autonomously program contouring cycles and benefit from practical application of skills acquired in simulations.

Maximize performance training

EDM–Die Sinking Macro programming 1

article n°200010605 (at GF site)
article n°200010606 (at customer site)

Die sinking

Duration	Number of participants	Experience level	Requirements	Machines
2 days	4	Intermediate	EDM–Die Sinking Basic training	DRILL 20, FORM , FORM E, FORM P, FORM S, FORM X

Increase your productivity for repeatable parts with Macro programming

What are the course contents?

- Presentation of objectives of macros
- Introduction to programming language
- Automation of repetitive measurements of workpieces and electrodes

What is the course objective?

- In this course, participants learn how to write basic Automation programs for repetitive tasks.

What are the course benefits?

- Gain time and secure your measurement processes in repetitive tasks.

Maximize performance training

EDM–Die Sinking Macro programming 2

article n°200010607 (at GF site)
article n°200010608 (at customer site)

Die sinking

Duration	Number of participants	Experience level	Requirements	Machines
2 days	4	Intermediate	EDM–Die Sinking Basic training Macro programming 1	DRILL 20, FORM , FORM E, FORM P, FORM S, FORM X

Save time and increase precision for repeatable parts with Macro programming

What are the course contents?

- Creation of an automatic complex measurement cycle such as a punch
- Automation of geometric correction directly in machining program

What is the course objective?

- In this course, participants learn how to write an advanced measurement program and how to automate geometric correction of cavities.

What are the course benefits?

- Gain time and secure your measurement processes in repetitive tasks. Benefit from practical application of skills acquired in simulations.

Maximize performance training

EDM–Die Sinking Smart tool 1

article n°200010609 (at GF site)
article n°200010610 (at customer site)

Die sinking

Duration	Number of participants	Experience level	Requirements	Machines
1 day	4	Intermediate	EDM–Die Sinking Basic training	DRILL 20, FORM , FORM E, FORM P, FORM S, FORM X

Save cost in EDM Die sinking with tool compensation and wear partitioning from the Smart tool option

What are the course contents?

- Presentation of objectives of Smart Tool modules (Compensation, Wear Partitioning, Life Tool and Declassing)
- Application of geometric compensation program
- Creation of a simple program with wear partitioning (distribution of electrode wear)

What is the course objective?

- In this course, participants learn how to write a simple program to ensure precision of ± 5 µm in as many as five identical cavities.

What are the course benefits?

- Save up to 30% in electrode consumption.

Maximize performance training

EDM–Die Sinking Smart tool 2

article n°200010611 (at GF site)
article n°200010612 (at customer site)

Die sinking

Duration	Number of participants	Experience level	Requirements	Machines
3 days	4	Intermediate	EDM–Die Sinking Basic training Smart tool 1	DRILL 20, FORM , FORM E, FORM P, FORM S, FORM X

Save cost in EDM Die sinking with life tool and declassing from the Smart tool option

What are the course contents?

- Production of a complete program with target precision of ± 5 µm
- Analysis of results and implementation of automatic correction
- Creation of an advanced program

What is the course objective?

- IIn this course, participants learn how to write an advanced program to ensure precision of ± 5 µm in five or more identical cavities.

What are the course benefits?

- Optimize the life span of your electrodes and reduce the number of electrodes you consume by more than 30%.

Maximize performance training

EDM–Wire Advanced training

article n°200010681 (at GF site)
article n°200010682 (at customer site)

Wire cutting

Duration	Number of participants	Experience level	Requirements	Machines
3 days	4	Intermediate	EDM-WIRE Basic training	AC Progress, CUT E, CUT P, CUT P Pro, CUT X 000

Increase productivity with EDM Wire cutting by optimizing process parameters

What are the course contents?

- Review of basic course modules
- Mastering generator parameters
- Possibility of introduction of very fine wire (≤ 0.1 mm)

What is the course objective?

- In this course, participants have the chance to increase their basic knowledge and optimize machining sequences for nonstandard scenarios (stepped sections, exotic materials, etc.).

What are the course benefits?

- Enhancing the productivity of your equipment thanks to better knowledge of the interaction of the primary machining parameters.

Maximize performance training

EDM–Wire
Thin wires

article n°200010685 (at GF site)
article n°200010686 (at customer site)

Wire cutting

Duration	Number of participants	Experience level	Requirements	Machines
1 day	4	Intermediate	EDM-WIRE Basic training Advanced training	AC Progress, CUT E, CUT P, CUT P Pro, CUT X 000

Produce high precision parts in EDM Wire cutting by mastering thin wires set-up and process

What are the course contents?

- Presentation of objectives of machining with fine wire
- Presentation of fine wire ranges and their respective applications
- Raising awareness of the importance of wire quality
- Machine configurations
- Option assembly
- Machine settings
- Creating a full example

What is the course objective?

- In this course, participants learn how to make high-precision pieces with radii less than 0.1 mm.

What are the course benefits?

- Gain the skills you need in order to produce small-radius pieces.
- Answer customers' needs and open new market horizons.
- Learn to produce very high-precision, fine-geometry pieces (slot type, miniature gears, clock mechanisms, etc.).

Maximize performance training

EDM–Wire Advanced programming

article n°200010689 (at GF site)
article n°200010690 (at customer site)

Wire cutting

Duration	Number of participants	Experience level	Requirements	Machines
2 days	4	Intermediate	EDM-WIRE Basic training Advanced training	AC Progress, CUT E, CUT P, CUT P Pro, CUT X 000

Master productivity in EDM Wire cutting by using advanced programming

What are the course contents?

- Introduction to specific advanced programming language
- Automation of repetitive measurements of pieces and machining processes
- Creation of standardized routines
- Creation of a measurement ratio program
- Strategy for optimized machining of one or more workpieces
- Creating a full example

What is the course objective?

- In this course, participants learn how to standardize complex routines, such as measurement of pieces and automated machine Tooling.

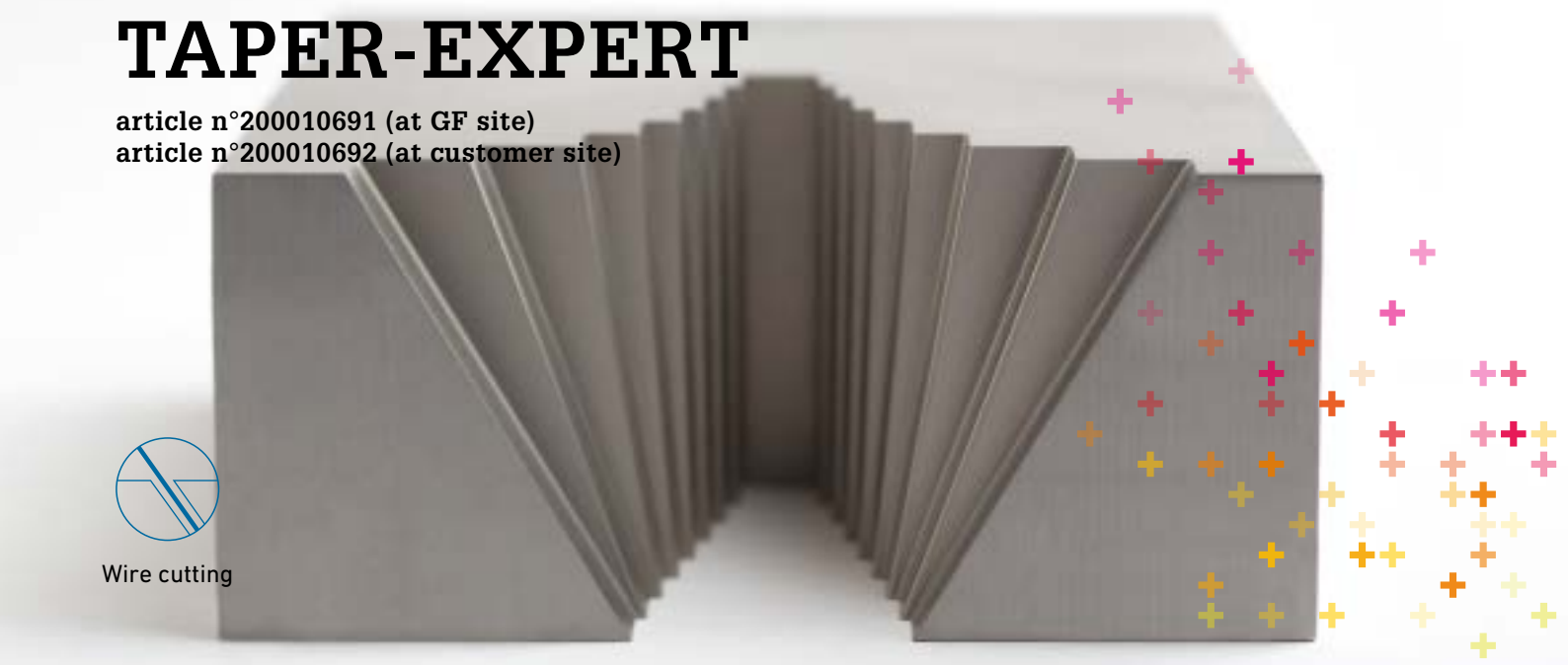
What are the course benefits?

- Make productivity gains, eliminate the risk of error, and profit from enhanced flexibility by machining at different levels of precision.

Maximize performance training

EDM–Wire TAPER-EXPERT

article n°200010691 (at GF site)
article n°200010692 (at customer site)



Wire cutting

Duration	Number of participants	Experience level	Requirements	Machines
1 day	4	Intermediate	EDM-WIRE Basic training Advanced training	AC Progress, CUT E, CUT P, CUT P Pro, CUT X 000

Master precision and surface finish on conical workpieces with EDM Wire cutting

What are the course contents?

- Machine configurations
- Option assembly
- Machine settings
- Raising awareness of the importance of wire quality
- Definition of objective and limits
- Selection of wires according to required precision and inclination
- Creating a full example

What is the course objective?

- In this course, participants learn how to machine precision conical workpieces without affecting the surface finish.

What are the course benefits?

- Acquire knowledge on important and necessary elements for the successful machining of ultra-precise angles in order to make productivity gains and eliminate the risk of error.

ACADEMY
Passion for Education

Dedicated training

Customized training based on your specific needs to increase your knowledge and machine performance.

Training for all level

Dedicated training

article n°200011001 (at GF site)
article n°200011002 (at customer site)

Duration	Number of participants	Experience level	Requirements	Machines
Based on your needs	Based on your needs	All levels	Based on your expectations	For all technologies

Realize the full potential of your machine with training customized to your needs

What are the course contents?

- Adapted to your machine
- Adapted to your operator's skill level
- Adapted to your business needs

What is the course objective?

- Provide your operators with the key knowledge to achieve your business objectives.

What are the course benefits?

- Acquire the knowledge essential to successful machining.

About GF Machining Solutions

Multi–technology solutions provider

Our commitment to you and your specific applications is proven by the value-adding intelligence, productivity and quality delivered by our multi-technology solutions. Your success is our chief motivator. That's why we are continuously advancing our legendary technical expertise. Wherever you are, whatever your market segment and whatever the size of your operation, we have the complete solutions and the customer-centric commitment to accelerate your success—today.

EDM (Electrical Discharge Machining)

Wire-cutting EDM
GF Machining Solutions' wire-cutting EDM is fast, precise and increasingly energy efficient. From ultraprecise machining of miniaturized components down to 0.02 mm to powerful solutions for demanding high-speed machining with respect to surface accuracy, our wire EDM solutions position you for success.

Die-sinking EDM
GF Machining Solutions is revolutionizing die-sinking EDM with features like iGAP technology to dramatically boost machining speed and reduce electrode wear. All of our die-sinking systems offer fast removal and deliver mirror finishes of Ra 0.1 µm (4 µin).

Hole-drilling EDM
GF Machining Solutions' robust hole-drilling EDM solutions enable you to drill holes in electrically conductive materials at a very high speed—and, with a five-axis configuration, at any angle on a workpiece with an inclined surface.

Milling

Milling
Precision tool and mold manufacturers enjoy a competitive edge with our Mikron MILL S solutions' fast and precise machining. The Mikron MILL P machines achieve above-average productivity thanks to their high performance and Automation. Customers seeking fastest return on investment benefit from the affordable efficiency of our MILL E solutions.

High Performance Airfoil Machining
Our Liechti turnkey solutions enable the highly dynamic manufacturing of precision airfoils. Thanks to the unique performance and our expertise in airfoil machining, you increase productivity by producing at the lowest cost per part.

Spindles
As part of GF Machining Solutions, Step-Tec is engaged in the very first stage of each machining center development project. Compact design combined with excellent thermal and geometric repeatability ensure the perfect integration of this core component into the machine tool.

Advanced manufacturing

Laser texturing
Aesthetic and functional texturing is easy and infinitely repeatable with our digitized Laser technology. Even complex 3D geometries, including precision parts, are textured, engraved, microstructured, marked and labeled.

Laser micromachining
GF Machining Solutions offers the industry's most complete line of Laser micromachining platforms optimized for small, high-precision features to meet the increasing need for smaller, smarter parts to support today's leading-edge products.

Laser Additive Manufacturing (AM)
GF Machining Solutions and 3D Systems, a leading global provider of additive manufacturing solutions and the pioneer of 3D printing, have partnered to introduce new metal 3D printing solutions that enable manufacturers to produce complex metal parts more efficiently.

Tooling and Automation

Tooling
Our customers experience complete autonomy while maintaining extreme accuracy, thanks to our highly accurate System 3R reference systems for holding and positioning electrodes and work pieces. All types of machines can easily be linked, which reduces set-up times and enables a seamless transfer of workpieces between different operations.

Automation
Together with System 3R, we also provide scalable and cost-effective Automation solutions for simple, single machine cells or complex, multi-process cells, tailored to your needs.

Software

Digitalization solutions
To drive its digital transformation, GF Machining Solutions acquired symmedia GmbH, a company specialized in software for machine connectivity. Together, we offer a complete range of Industry 4.0 solutions across all industries. The future requires the agility to adapt quickly to continual digital processes. Our intelligent manufacturing offers embedded expertise, optimized production processes, and workshop Automation: solutions for smart and connected machines.

Customer Services

Worldwide for you
Ensuring the best performance throughout the lifetime of our customers' equipment is the goal of our three levels of support. Operations Support offers the complete range of original wear parts and certified consumables. Machine Support includes spare parts, technical support, and a range of preventive services to maximize machine uptime. Business Support offers customer-specific business solutions.

Worldwide for you

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Biel/Bienne
Losone
Geneva
Flawil
Langnau

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At a glance

We enable our customers to run their businesses efficiently and effectively by offering innovative Milling, EDM, Laser, Additive Manufacturing, Spindle, Tooling and Automation solutions. A comprehensive package of Customer Services completes our proposition.

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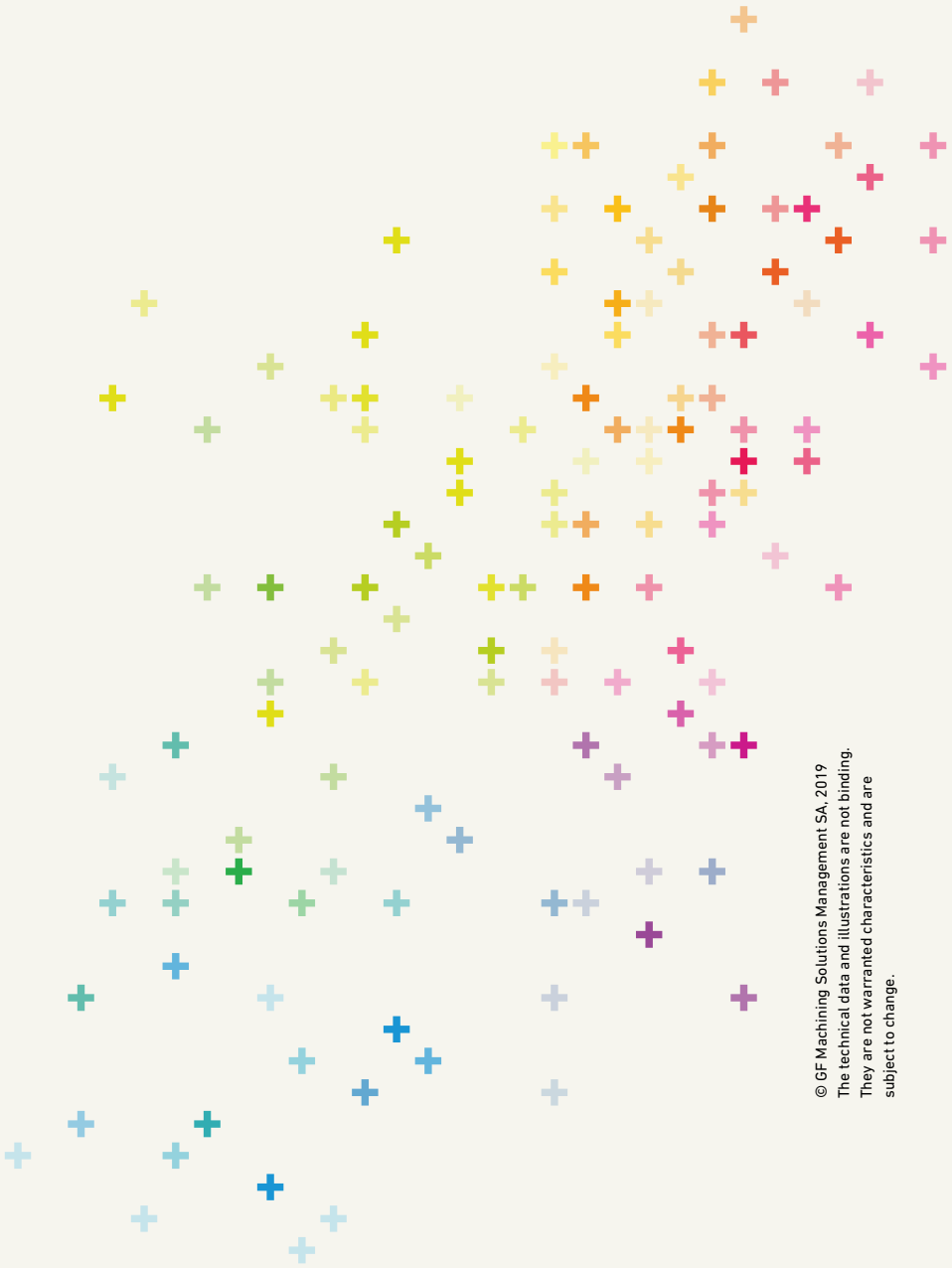

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