

Full liners for Medical

Consulting, machine, automation, programming, service and support for quality management and certification issues



Overview

Four segments

Dental

Additive manufacturing

Integrated digitization

DMG MORI MEDICAL EXCELLENCE CENTER

We support you during all stages

02



DIGITIZATION & SERVICE

- + DMG MORI Connectivity in standard
- + DMG MORI NETservice
- + my DMG MORI Customer Portal for service optimization



DMQP & PARTNER

All topics related to the machine
(e.g. tooling, clamping ...)



MACHINING & TURN KEY

- + Turning & milling
- + LASERTEC *SLM*
- + ULTRASONIC
- + Automation

EARLY INVOLVEMENT

**DMG MORI
MEDICAL EXCELLENCE CENTER**
Consulting, process & technology
development, ...



MARKET & PARTS

- + Implants
- + Prostheses
- + Instruments
- + Devices

REGULATION & CERTIFICATION

- + Consulting for market barriers, ISO13485, FDA
- + Greenfield projects

§

COMPLETE PROCESS CHAIN

- + Machining method
- + Simulation
- + CAM (NX / ESPRIT)



OF OUR CUSTOMERS

STANDARD PROCESS

Machine, time study, quote, order, delivery, ...

Overview
Four segments
Dental
Additive manufacturing
Integrated digitization

DMG MORI MEDICAL EXCELLENCE CENTER

Expertise in the medical sector – four segments

IMPLANTS



Filigree components and screws,
joints and bone plates

More from page 08

PROSTHESES



Hand, knee, lower leg
and foot prostheses

More from page 12

“We support our customers holistically and right from the start: From the first planning, support with certification questions, programming and production, up to quality management. And this customer-specific.

Horst Lindner
Head of the DMG MORI Medical Excellence Center
DECKEL MAHO Seebach GmbH



Dental

More than just dental crowns

More from page 18



INSTRUMENTS



Scissors, forceps, cloth clamps,
guides, navigation

More from page14

DEVICES



Focus on large devices

More from page16



ADDITIVE MANUFACTURING

Two integrated process chains
for powder bed machining

More from page20



Integrated digitization

Planning, preparation, production,
monitoring and service

More from page22

DMG MORI MEDICAL EXCELLENCE CENTER

Medical technology – a sector with innovation and growth potential

Demographic development and rising healthcare expenditure caused by a higher standard of living mean that medical technology experts are certifying extraordinarily high potential for growth.

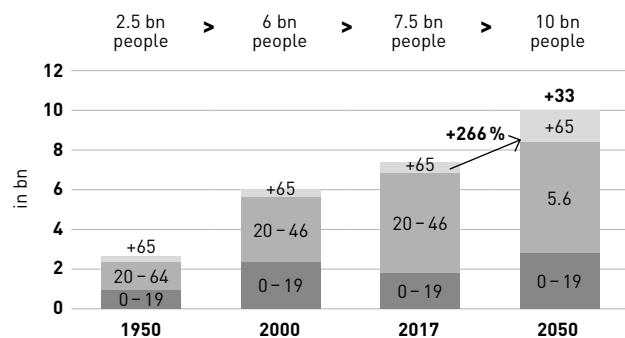
MARKET DRIVERS OF THE MEDICAL INDUSTRY

Rising healthcare expenditure caused by:

- + 33% increase in the global population*
- + 266% increase in the number of people aged 65 and above*

*Comparing 2017 to 2050

Source: Own diagram based on: Avicenne Research & Analysis 2017, United Nations – World Population Prospects, The 2012 Revision, several data 2014 – 2017

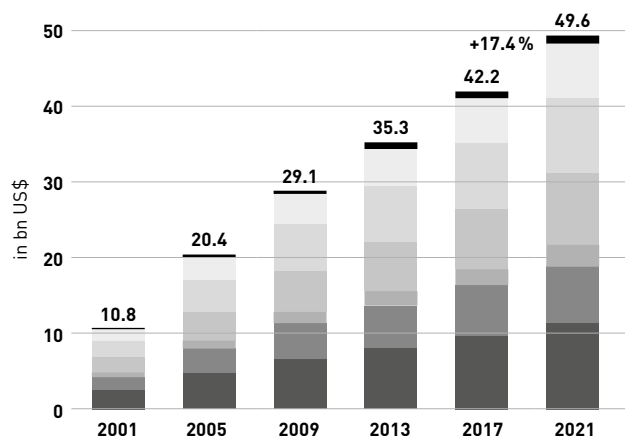


PRODUCTION OF ORTHOPEDIC TECHNOLOGY WORLDWIDE

2017 vs. 2021

- Orthobiology: 21.9%
- Spine: 11.8%
- Trauma and CMF: 20.5%
- Extremities: 40.8%
- Hips: 11.1%
- Knees: 16.0%

Source: Own diagram based on Avicenne – The Worldwide Orthopedic Contract Manufacturing Market Report 2017 – 2021





Your contact person

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DMG MORI MEDICAL EXCELLENCE CENTER

Development and consulting for and with our customers

- + Interdisciplinary experts advise our customers right from the start of potential projects with regard to topics like turning, milling, ULTRASONIC, automation and software
- + General transfer of expertise with other Technology Excellence Centers, e.g. with aerospace experts, for special requirements encountered in mill&turn applications involving large workpieces for tomographs, or with experts working in the additive manufacturing sector



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GETTING OUR CUSTOMERS INVOLVED AT AN EARLY STAGE

DMG MORI MEDICAL EXCELLENCE CENTER

STANDARD PROCESS

- + Greenfield consulting
- + Process development
- + Consulting on regulatory issues
- + Turnkey/automation solutions
- + Machining new materials, e.g. developing machining strategies for SMAs (shape memory alloys)

Selecting the
machines

Time study/
technology

Quotation

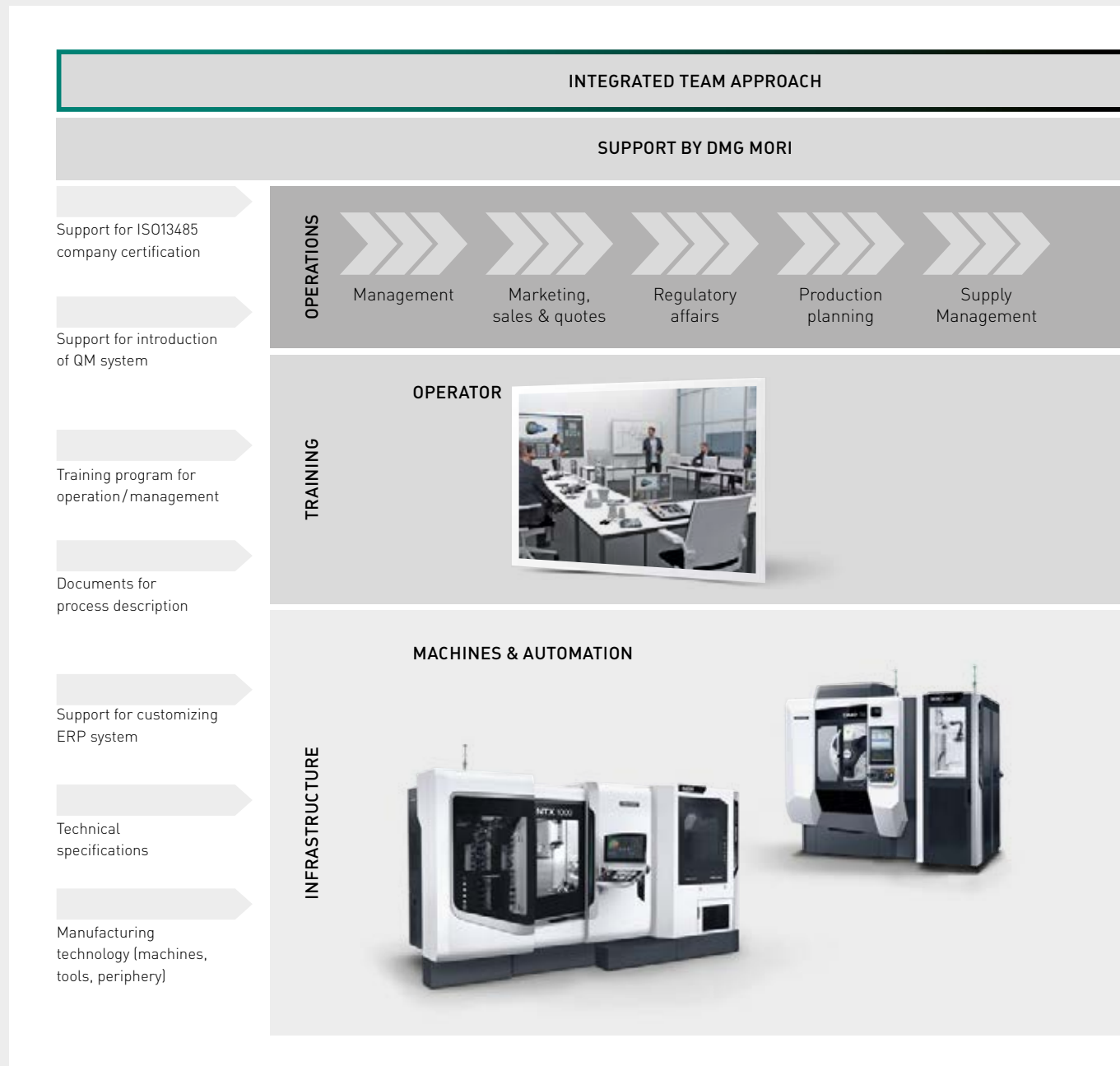
Order

Delivery

Overview
Four segments
Dental
Additive manufacturing
Integrated digitization

DMG MORI MEDICAL EXCELLENCE CENTER

DMG MORI Medical Consulting – Your entry into the medical business

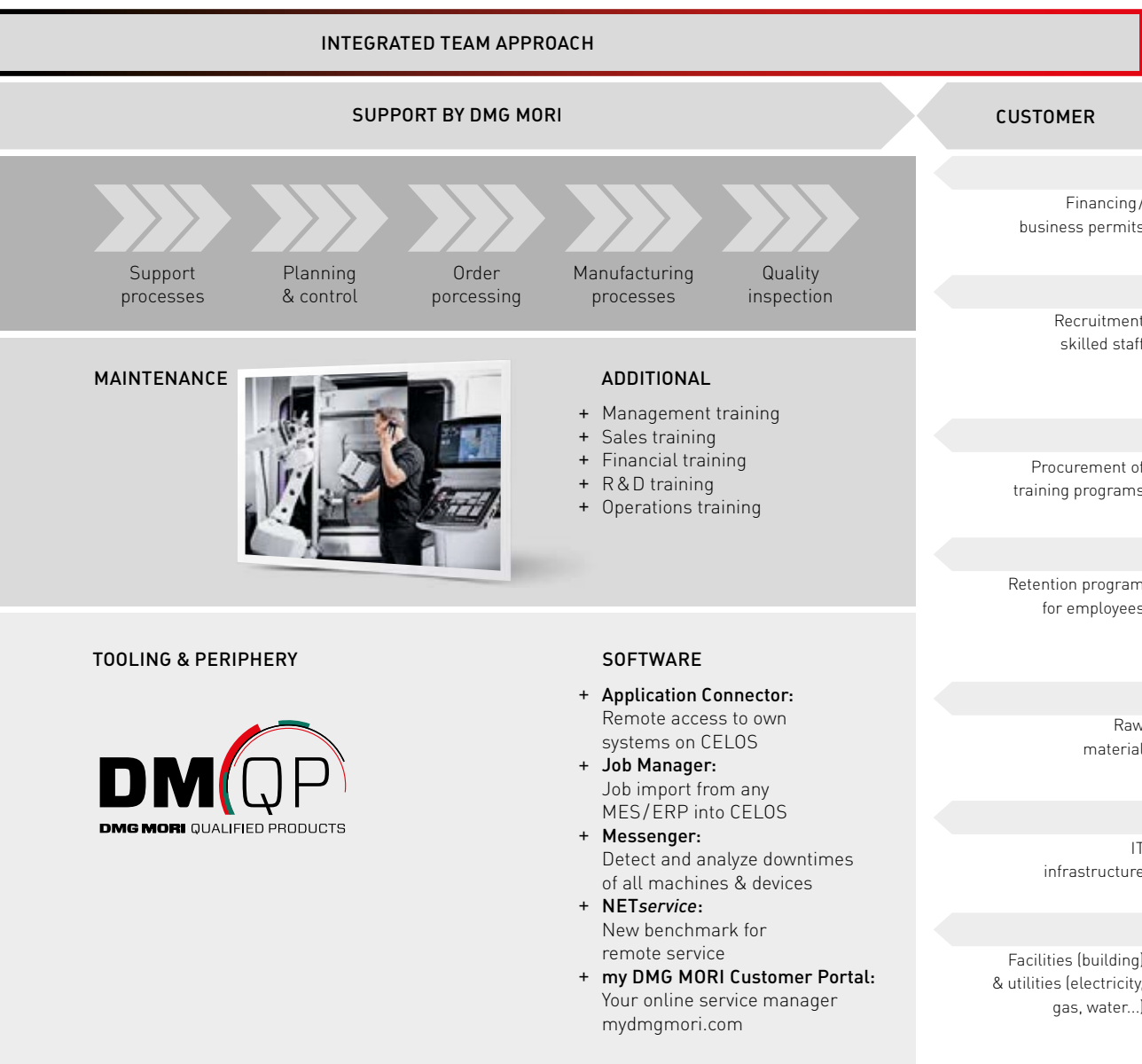




Strong regulations and comprehensive documentation due to the MDR (Medical Device regulations) are market barriers which DMG MORI Medical Consultancy tries to solve together with our customers.

We support in every phase of Development, Testing, Documentation, Registration, Certification and Validation with our transparent and reliable future processes due to existing laws and Standards.

Marcus Krüger
Key Account Manager for Medical Industries



DMG MORI MEDICAL EXCELLENCE CENTER

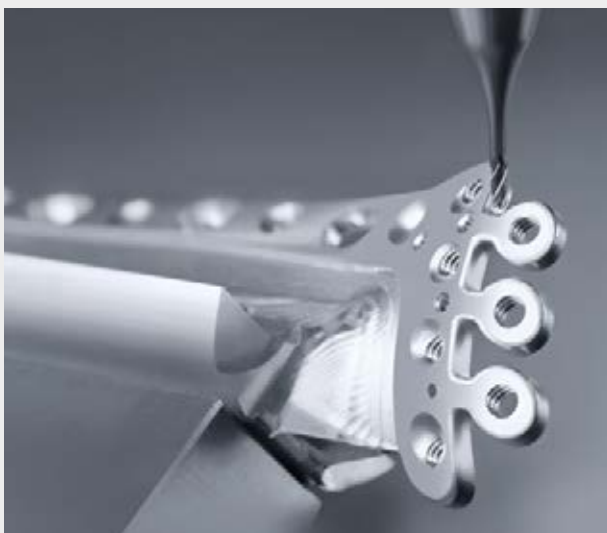
Your requirement – our solution

At our Medical Excellence Center in Seebach, we provide our customers with the **experience gained from hundreds of successfully implemented medical projects**. Together with our customers, we develop integrated technology solutions, define effective automation processes for the very best quality and autonomy and safeguard the processes with digitalized workflows. **We are unique – as a complete provider of turning, milling, automation and software products, plus new technologies such as additive manufacturing**, we offer solutions for all workpieces and requirements from a single source.



PRODUCTION FROM A BATCH SIZE OF 1 UP TO MASS PRODUCTION

- + **Flexible automation for a batch size of 1**,
e.g. for just-in-time production of custom-made patient implants → Production cell comprising one or more machines
- + **Automation for mass production**,
e.g. for standardized components such as screws → MULTISPRINT – SWISSTYPE



CUTTING – NEW MATERIALS

- + **Degradable Mg alloys** → e.g. DMP 70 with fire extinguishing system and two-stage flame detector
- + High-strength **plastics, stainless steel and titanium**
→ speedMASTER spindles up to 30,000 rpm
or HSC spindles up to 60,000 rpm
- + **Hard-brittle materials** (e.g. ceramics) and composites
→ ULTRASONIC machining
- + **SMA (shape memory alloys) or polymers**
→ Developing reliable machining strategies



OPEN CONNECTIVITY

- + **Connecting the machines to the customer's MES** (manufacturing executive system)
 - DMG MORI IoTconnector as a bidirectional interface
 - Support e.g. for OPC UA, for sending and receiving data with a customized UDI interface
- + **Continuous documentation** of each workpiece
 - Barcode scanner – data is collected by means of the IoTconnector directly at the customer's MES system



DIGITAL AND AUTOMATED PROCESSES

- + **Integrated process chain** – from planning and CAD/CAM programming to production
 - CAD/CAM programming, e.g. NX CAM
 - Automatic transmission thanks to CELOS
- + **Traceability of the entire production process** from each individual workpiece
 - Automatic blank recognition via QR code
- + **Increased process reliability**
 - Camera-based component recognition



QUALITY MANAGEMENT

- + **Machine, technology and automation** from a single source
 - Digital twin for green button process
- + **100 % good parts** or automatic ejection of faulty parts
 - Adaptive in-process measurement, e.g. CMM workpiece measurement or surface quality using CELOS APP Surface Analyzer

DMG MORI MEDICAL – FOUR SEGMENTS

Implants – filigree components and screws

DMG MORI
#1 worldwide
for implants

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SHORT TURNING

Dental implant

ø 6 × 11 mm, titanium
SPRINT 20|8: 160 sec.
MULTISPRINT 36: 24.7 sec.



Lamina hook

ø 24 × 20 mm, titanium
SPRINT 20|8: 280 sec.
MULTISPRINT 36: 50 sec.



Basic dental implant

ø 7 × 12 mm, titanium
SPRINT 20|8: 105 sec.
MULTISPRINT 36: 23 sec.



LONG TURNING WITH SWISSTYPEkit

Bone screw

ø 4 × 20 mm, titanium
SPRINT 20|8: 110 sec.
MULTISPRINT 36: 25 sec.



Monoaxial screw

ø 16 × 70 mm, titanium
SPRINT 20|8: 410 sec.
MULTISPRINT 36: 65 sec.



Fixator screw

ø 4 × 120 mm, titanium
SPRINT 20|8: 380 sec.
MULTISPRINT 36: 58 sec.





SPRINT 20/SPRINT 32

- + **Automatic lathes** for workpieces up to $\varnothing 20$ or $\varnothing 32$ mm
- + **SWISSTYPEkit for short and long turning on one machine:**
 - SPRINT 20: extended spindle stroke from 60 to 180 mm
 - SPRINT 32: extended spindle stroke from 100 to 240 mm
- + **<2m installation surface** for the SPRINT 20, SPRINT 32 <2.8 m² (without chip conveyor, ICS, etc.)
- + Automation via bar loader (optional)



MULTISPRINT 36

- + **Multi-spindle automatic lathe** for workpieces up to $\varnothing 36$ mm
- + **SWISSTYPEkit for short and long turning on a single machine:** spindle stroke lengthened from 100 to 240 mm
- + **Powered tools** and Y-axis in all spindle positions
- + **Automation** via integrated bar loader or up to two integrated robots for chuck components up to $\varnothing 50$ mm (optional)



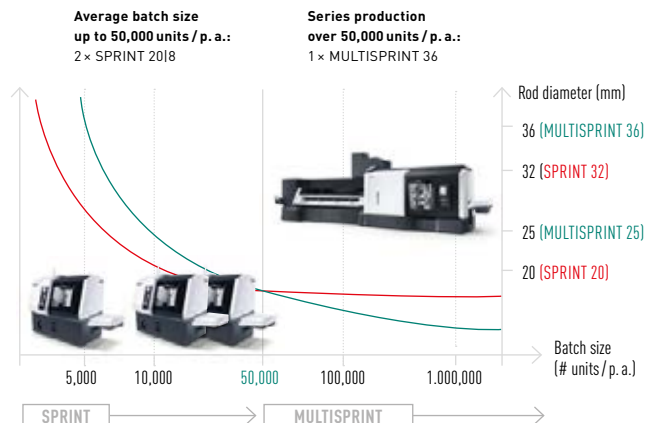
THREAD WHIRLING FOR THE SPRINT AND MULTISPRINT

- + **Patented unit** for external thread whirling with direct drive
- + **Machining up to a diameter of 15 mm**, adjustable angle $\pm 15^\circ$
- + **Cooled direct drive** with 8 Nm torque and 2 kW power (10 % ED), speed range 1,500 to 4,000 min

SPRINT OR MULTISPRINT – ALWAYS THE RIGHT MACHINE FOR SERIES PRODUCTION

Example of a bone screw

- + 8×70 mm, titanium
- + Machining time:
SPRINT 20|8: 210 sec.
MULTISPRINT 36: 45 sec.
- + 30 % less space required for a MULTISPRINT 36 compared to 2× SPRINT 20|8 (21.9 vs. 31.7 m² incl. bar loader, chip conveyor, etc.)
- + Use of the same cutting tool technology on SPRINT and MULTISPRINT



DMG MORI MEDICAL – FOUR SEGMENTS

Implants – joints and bone plates



NTX 1000

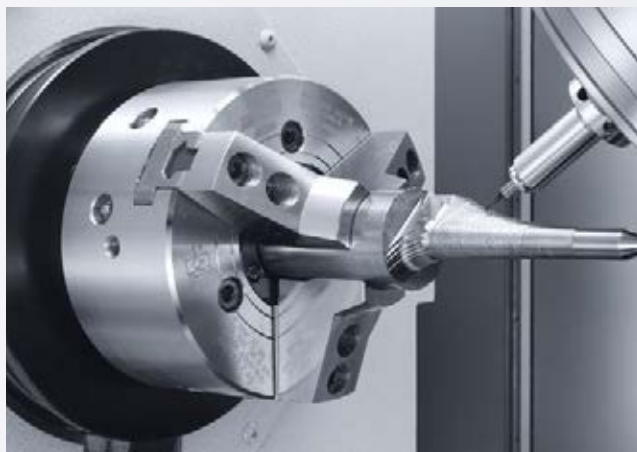
- + **Turn & Mill machining center** for six-sided complete machining
- + **compactMASTER turning/milling spindle** with 12,000 rpm (20,000 rpm optional) and **36-month warranty** without any limit on the number of operating hours as standard
- + **Five-axis simultaneous machining** thanks to DirectDrive B-axis with $\pm 120^\circ$ swivel range
- + **Four-axis machining** thanks to second tool carrier as lower turret
- + **Automation via bar loader** for workpieces up to $\varnothing 65$ mm or integrated and mobile robot (IMTR), for workpieces up to $\varnothing 100$ mm

Hip joint implant
 $\varnothing 40 \times 136$ mm, titanium
NTX 1000: 42 min.

Acetabulum
 $\varnothing 52 \times 40$ mm, titanium
NTX 1000: 280 sec.



Six-sided
complete
machining
of complex
implants



DMG MORI technology cycle Polygon/oval turning

- + Simple machining of non-circular parts
- + Intuitive user interface for polygon or oval turning
- + Machining on main or counter spindle can be combined



Knee joint

ø 92 × 90 mm, CoCr
DMU 40 eVo: 42 min.



Bone plate

ø 12 × 20 × 118 mm, titanium
DMP 70: 35.5 min.



DMU 40 eVo

- + **Five-axis universal machining center** with up to 1g acceleration
- + **Swivel rotary table** for machining of negative angles down to -20°
- + **20,000 rpm speedMASTER spindle** with 36-month warranty without any limit on the number of operating hours as standard, optional HSC spindles up to 60,000 rpm
- + **Automation as WH 8 or WH 15 Cell:**
WH 6 Cell: Workpieces up to 300 × 280 × 100 mm, 6 kg
WH 8 Cell: Workpieces up to 300 × 300 × 130 mm, 8 kg
WH 15 Cell: Workpieces up to 300 × 300 × 220 mm, 15 kg



DMP 70

- + **Five-axis simultaneous machining** though direct drive table up to 100 kg* (optional)
- + **10,000 rpm inline spindle** with 78 Nm as standard, optional 24,000 rpm to 12 Nm or 20 Nm (BT 30, SK 30)
- + **5 µm positioning accuracy** thanks to direct measuring systems from MAGNETIC
- + Up to **2g acceleration** for the shortest possible chip-to-chip time of 1.5 sec.
- + **Automation** as WH 3 Cell from the left, right or front: for workpieces up to 300 × 200 × 100 mm and 5.5 kg (3 kg as standard)

DMG MORI technology cycle

ATC 2.0 – application tuning cycle

- + Process-oriented adjustment of the feed speed in relation to table loading
- + Minimization of processing time with maximization of the relevant component quality



DMP 70 – MEDICAL PACKAGE

- + Stainless steel covers in the working area
- + Inline spindle with 24,000 rpm and 20 Nm
- + Swiveling rotary table for five-axis simultaneous processing incl. DMG MORI technology cycle 3D quickSET and ATC – application tuning cycle
- + toolSTAR tool magazine with 25 pockets
- + Chip conveyor and space saving 40-bar ICS
- + Tool measurement and measuring probe
- + Oil processing package incl. fire extinguishing system

DMG MORI MEDICAL – FOUR SEGMENTS

Prostheses – hand, knee, lower leg and foot prostheses

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CTX beta 1250 TC 4A

- + Turn & Mill machining center for **six-sided complete machining**
- + **compactMASTER turn & mill spindle with 12,000 rpm** (20,000 rpm optional) and 36-month warranty without any limit on the number of operating hours as standard
- + **Five-axis simultaneous machining** thanks to DirectDrive B-axis with $\pm 120^\circ$ swivel range
- + Four-axis machining thanks to **second tool carrier as lower turret**
- + **Automation via bar loader** for workpieces up to $\varnothing 102$ mm

Leg prosthesis component

$\varnothing 52 \times 65$ mm, aluminum
NTX 2000: 8 min. 18 sec.



DMG MORI technology cycle: 3D quickSET – turning

- + Measurement and correction of the position of rotary and swivel axes (C4/C3/B)
- + Sag compensation possible
- + Reliable recalibration of the machine prior to high-precision machining





Lower leg prosthesis

310 × 130 × 120 mm, titanium
DMU 50 3rd Generation: 110 min.



Foot core for lower leg prosthesis

150 × 150 × 50 mm, titanium
DMP 70: 2 h 5 min.

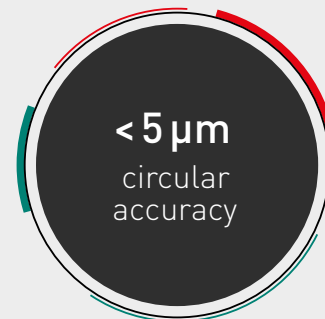
DMU 50 3rd GENERATION

- + **Five-axis universal machining center** for workpieces up to $\varnothing 630 \times 500$ mm and 300 kg
- + **Swivel rotary table** for machining of negative angles down to -20°
- + 15,000 rpm **speedMASTER spindle** with 36-month warranty without any limit on the number of operating hours as standard, optional speedMASTER spindles up to 20,000 rpm or 200 Nm
- + **Automation as pallet handling PH 150**
 - Max. load capacity 150 kg, 250 kg optional
 - Six pallets, each 320×320 mm, or ten pallets, each 400×400 mm

DMG MORI technology cycle

MPC 2.0 – machine protection control

- + In-process vibration monitoring
- + Rapid machine shutdown in the event of a crash
- + Manual retraction even on a tilted machining plane
- + **NEW:** Torque monitoring



Lower leg prosthesis

310 × 130 × 120 mm, CFK
ULTRASONIC 65: 46 min.

ULTRASONIC INTEGRATION FOR RELIABLE MACHINING OF COMPOSITES

- + **40 % lower process forces** and **100 % higher cutting speed** due to ULTRASONIC overlay of the cutting direction
- + Ideal for **trimming and drilling** composite materials with clean edges without fiber tearing and delamination
- + **ULTRASONIC integration** in all five-axis machines from DMG MORI, e.g. DMU, DMU eVo, DMF, monoBLOCK, duoBLOCK, Portal and Gantry



DMG MORI MEDICAL – FOUR SEGMENTS

Instruments – scissors, forceps, cloth clamps, guides, navigation

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Guide for traumatology

40×80×200 mm, titanium
DMP 70: 31 min.



DMG MORI technology cycle: 3D quickSET – milling

- + Tool kit for checking and correcting the kinematic accuracy of four and five-axis machine configurations
- + All head variants and table axes





Forceps segment
205×15×40 mm,
X8CrNiS 18 – 9



Bone rasp for femoral head prosthesis
135×12.7×36 mm, X40CrMoV5-1
CTX beta 800 TC: approx. 145 min.

THREE MACHINING PHILOSOPHIES – ALWAYS THE RIGHT SOLUTION

DMG MORI technology cycle

Five-axis simultaneous machining

- + Free-form surfaces due to five-axis interpolation on the main and counter spindles
- + Turning and milling with interpolating B-axis
- + With ATC turning for increased machine dynamics
- + Look-ahead function for a continuous process



SEQUENTIAL MACHINING

Optimum use of machinery with minimal requirements

- + Premachining incl. the connecting surfaces
- + The tips are reworked on five axes
 - Premachining: 7 min.
 - Five-axis machining: 3 min. 47 sec.

CMX 600 V

- + Vertical machining center, with stable C-Frame design and high-precision IT1 ball screw drives
- + Automation as a pallet pool:
 - 114-pocket pallet pool AWC for workpieces up to ø230×150 mm and 50 kg
 - PH 150 with up to ten pallet stations, each 320×320 mm
- + Automation as WH 15 Cell workpiece handling: Workpieces up to 300×300×220 mm, 15 kg



COMPLETE MACHINING MILLING

Batch sizes are completely machined without intermediate handling – QM/quality optimization

- + Complete machining, incl. the tips on one machine
 - Five-axis complete machining: 9 min. 39 sec.

DMU 50 3rd Generation

- + Five-axis universal machining center for workpieces up to ø630×500 mm and 300 kg
- + Automation as WH 8 or WH 15 Cell workpiece handling:
 - WH 8 Cell: Workpieces up to 300×300×130 mm, 8 kg
 - WH 15 Cell: Workpieces up to 300×300×220 mm, 15 kg



COMPLETE MACHINING TURN & MILL

60% lower costs for bar material

- + Six-sided complete machining, incl. machining of all freeform surfaces
 - Five-axis complete machining: 9 min. 31 sec.

CTX beta 800 TC

- + Turn & Mill machining center for six-sided complete machining
- + Automation as workpiece handling:
 - Robo2Go workpieces from ø25 to ø170 mm
 - Bar loader for workpieces up to ø102 mm

DMG MORI MEDICAL – FOUR SEGMENTS

Devices – focus on large devices

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1

1. Computer tomograph
2. Linear accelerator for tumor treatment
3. C-arm tomograph for use during surgery

2

3



CT Gantry (computer tomograph)
 ø 1,400 × 450 mm, titanium

DMC FD duoBLOCK AND PORTAL MACHINES

- + **Ideal for bearings, housings and transmission rings** for computer tomographs or formers for magnetic resonance systems
- + **Milling/turning complete machining centers for workpieces up to:**
 - DMC 125 FD duoBLOCK: ø 1,250 mm
 - DMC 160 FD duoBLOCK: ø 1,600 mm
 - DMC 210 FD: ø 2,500 mm
 - DMC 270 FD: ø 3,400 mm
 - DMC 340 FD: ø 3,900 mm
- + Milling/turning table with **DirectDrive technology**
- + **More than 20 years of experience** with milling/turning machines, more than 1,000 installed machines (technology know-how from the aerospace sector, particularly casings and rotatives)

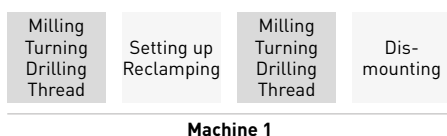


DMG MORI technology cycle: Grinding – milling

- + Milling, turning and grinding in a single setup
- + Best surface qualities up to $Ra < 0.4 \mu m$
- + Grinding cycles for interior, exterior and face grinding, plus truing cycles
- + Achievable tolerances
 - Surface quality $< 0.4 \mu m$
 - Circularity $< 5 \mu m$
 - Quality 5 with diameter $< 120 mm$
 - Quality 4 with diameter $> 120 mm$



DMU FD | DMC FD MACHINES – COMPLETE MACHINING PROCESS



Complete machining process:

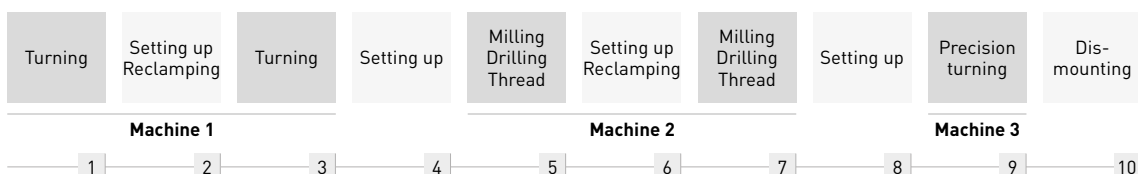
- + One machine
- + Four machining steps
- + 300 % more productivity

Conventional

machining process:

- + Three machines
- + Ten machining steps

SINGLE-PURPOSE MACHINES – CONVENTIONAL MACHINING PROCESS



DMG MORI MEDICAL – DENTAL

Dental – more than just dental crowns

HSC 20 *linear*/ULTRASONIC 20 *linear*

- + **Precise production** of implant-supported designs in all standard dental materials
- + **Special DMG MORI dental blank holder** for vibration-reduced production of titanium and CoCr alloys
- + **Swivel ranges of the A-axis kinematics** from -15 to +130° for complete machining of implant frameworks in a single setup
- + **Production of inlays, onlays, veneers and crowns** in lithium disilicate with ULTRASONIC technology → Minimization of chipping and micro-cracks, as well as thin preparation lines
- + **Tool wear and tool breakage detection**, incl. automatic program recoil and integration of sister tools
- + **Fully automated production** on < 6 m² → HSC 20 *linear* or ULTRASONIC 20 *linear* with 99-fold pallet handling (max. 10 kg handling weight)



Additive manufacturing:
Dental crowns/bridges

HSC materials
Cobalt chrome
Titanium



Dental crowns/bridges

HSC materials
Wax, acrylic
ZrO ₂ (pressed)
PMMA
Cobalt chrome
Titanium

ULTRASONIC materials
Glass ceramics
ZrO ₂ (cast)



Supra constructions

HSC materials
Wax, acrylic
ZrO ₂ (pressed)
PMMA
Cobalt chrome
Titanium

ULTRASONIC materials
ZrO ₂ (cast)



Bars

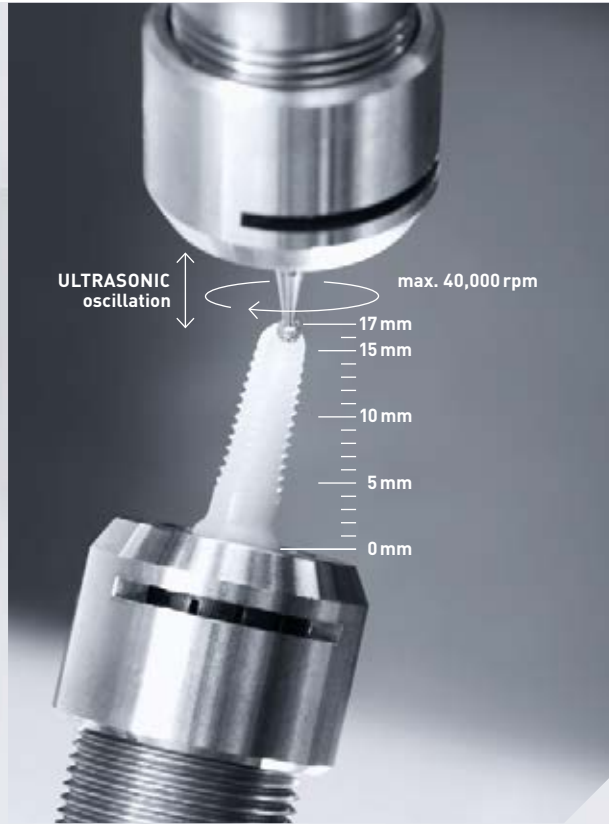
HSC materials
Wax, acrylic
ZrO ₂ (pressed)
Cobalt chrome
Titanium

ULTRASONIC materials
ZrO ₂ (cast)



HSC/MILLING

- + **Highly dynamic five-axis milling machining** of high-end dental prostheses and implants with max. 60,000 rpm
→ e. g. white ZrO₂, PMMA, titanium and CrCo

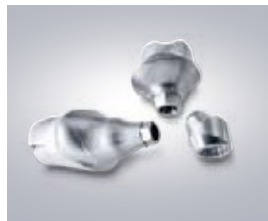


ULTRASONIC

- + **Overlay of tool rotation** with an additional oscillating movement for economical hardmachining with diamond tools
→ e. g. glass ceramics and cast ZrO₂



Inlays, onlays



Abutments



Implants



Special indications

HSC materials
ZrO ₂ (pressed)
PMMA
Cobalt chrome
Titanium

HSC materials
Wax, acrylic
ZrO ₂ (pressed)
Cobalt chrome
Titanium

HSC materials
ZrO ₂ (pressed)
Titanium

HSC materials
Metal-free palatal plates
Promysan occlusal splints
CrCo, titanium abutment posts
ZrO ₂ , CrCo, titanium telescopes

ULTRASONIC materials
Glass ceramics
ZrO ₂ (cast)

ULTRASONIC materials
ZrO ₂ (cast)

ULTRASONIC materials
ZrO ₂ (cast)

ULTRASONIC materials
ZrO ₂ (cast) abutment posts
ZrO ₂ (cast) telescopes

DMG MORI – ADDITIVE MANUFACTURING

ADDITIVE MANUFACTURING



- + **High-precision build-up** of 3D components with layer thicknesses of 20 to 100 µm
- + **Optimized gas flow control** for the best component quality with minimal argon consumption
- + **Maximum occupational safety** due to closed material cycle and integrated powder preparation
- + Replaceable **powder module rePLUG** for contamination-free material changeover <2h
- + **CELOS**: Integrated software solution from CAM programming with the RDesigner through to machine control

SELECTIVE LASER MELTING (SLM)



CELOS

SLM

**ADDITIVE
MANUFACTURING
IN THE POWDER BED**
Component size
max. 300 × 300 × 300 mm



SLM

**CUTTING
PROCESS**



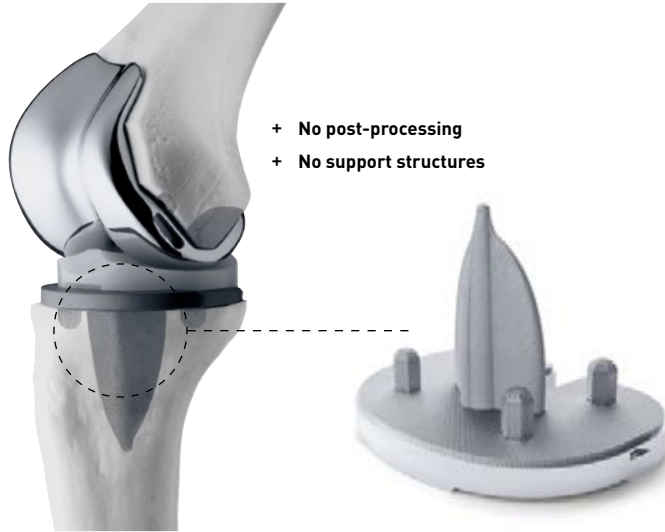
CELOS: Integrated software solution from CAM programming through to machine control

- + **Intuitive machine operation** thanks to touchscreen and app-based control
- + **RDesigner** – CAM programming directly at the machine:
 - Start with pure CAD model (STL)
 - Orientation/positioning
 - Support, slicing, hatching, copying
 - Generation of the process control file
- + **HEAT calculation**: Patented prediction of mass distribution and automatic adjustment of all laser parameters for the best component quality
- + **Monitoring tools**: Camera-based monitoring of the build-up and coating quality

THE DIRECT ROUTE TO THE FINISHED PART!

Sample application: Basic tibial plateau

- + Material: Ti6Al4V
- + Machining time for milling: 12 min/unit
- + Processing time for additive manufacturing: 9 hours (nine parts)
- + Layer thickness: 50 µm
- + Dimensions: 75 × 57 × 53 mm



- + No post-processing
- + No support structures



CUTTING PROCESS



Dental – Perfect-fit dental indications, such as bars, crowns or bridges made of cobalt chrome or titanium.



ADDITIVE MANUFACTURING IN THE POWDER BED

Component size
max. 300 × 300 × 300 mm



Medical – Individually adapted and tailor-made titanium implants. Complex lattice structures, e. g. in hip and knee implants.



NEW: Optomet – innovative and integrated software solution

- + **Automatic calculation** of process parameters for new and existing materials in a matter of minutes
- + **20 % lower material costs** – improved usability of already recycled powder without loss of quality
- + **Pre-calculation** of mechanical properties for selected materials thanks to integrated material database
- + **Adjustment of the process parameters to:**
 - Changed layer thicknesses, changed requirements (density, tensile strengths, etc.)
 - New powder suppliers/powder properties (e. g. recycling powder)
- + **Optional: rePLUG reSEARCH** – the powder module specifically developed for material development with OPTOMET

DMG MORI – DIGITAL SOLUTIONS

Integrated Digitization

ISTOS



Production Planning



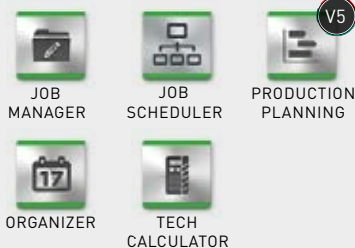
Tool
presetting

CELOS PC
CAD/CAM and simulation

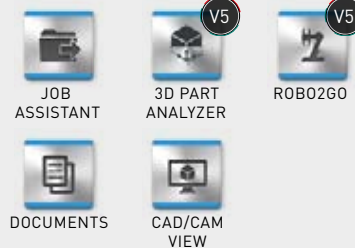


Machine with CELOS
Technology cycles

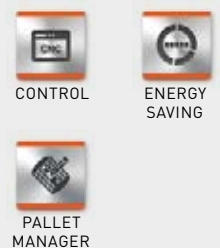
PLANNING



PREPARATION



PRODUCTION



PLANNING

ISTOS PLANNING SOLUTIONS

- + Integrated production planning and control system
- + Managing the complexity of all systems and processes
- + Connection to all machines and workstations

PLANNING, FEEDBACK AND COCKPIT

- + Dynamic planning of production orders
- + Direct confirmation of the production status
- + Machine and process data in real time

PREPARATION

CAD/CAM SYSTEMS

- + SIEMENS NX CAM and ESPRIT CAM
- + Continuous processing of design data
- + Reduction in order throughput times by up to 50 %

SIMULATION

- + DMG MORI Virtual Machine and VERICUT
- + 100 % reliable NC program provision
- + Shorten machine run-in times by up to 90 %

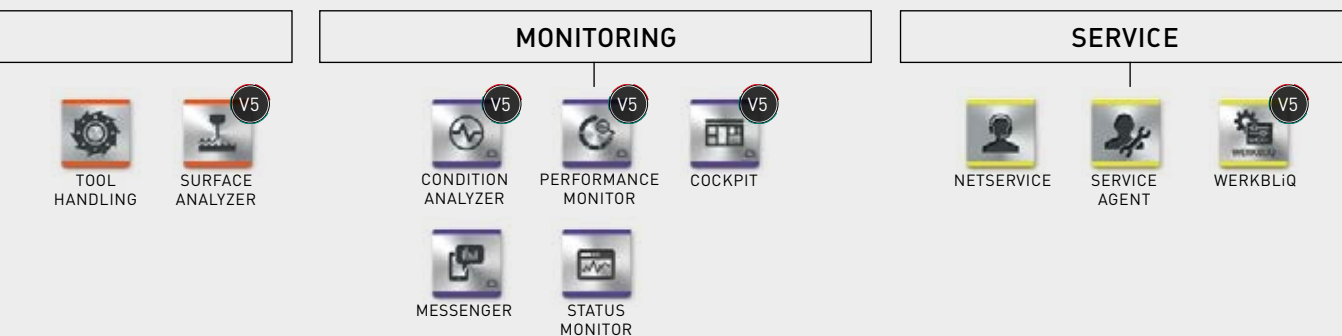
PRODUCTION

CELOS MACHINE

- + More than 14,500 CELOS machines in the field
- + CELOS with SIEMENS, MAPPS AND HEIDENHAIN

CELOS PC VERSION

- + Create and manage orders
- + Transfer data directly from the PC to the machine
- + Optimize machine utilization and process flow



MONITORING AND SERVICE

NETservice and SERVICEcamera

- + Reduce machine downtimes remotely
- + Quick error localization and optimum support

IoTconnector and RETROFIT KIT

- + Simple retrofitting to DMG MORI machines
- + Basis for future applications

MESSENGER AND PRODUCTION COCKPIT

- + Current status of all DMG MORI machines
- + Digital analysis of the production process

SERVICE AND MAINTENANCE

DOCUMENTATION AND CERTIFICATION

- + 100 % consistent documentation
- + Perfectly prepared for audits

MAINTENANCE AND REPAIR

- + Up to 50 % faster machining
- + Automatic maintenance reminders

COMMUNICATION

- + Fast transmission of information
- + Digital "blackboard"



DMG MORI MEDICAL EXCELLENCE CENTER

Your contacts



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