Innovative solutions for tomorrow

GF Machining Solutions

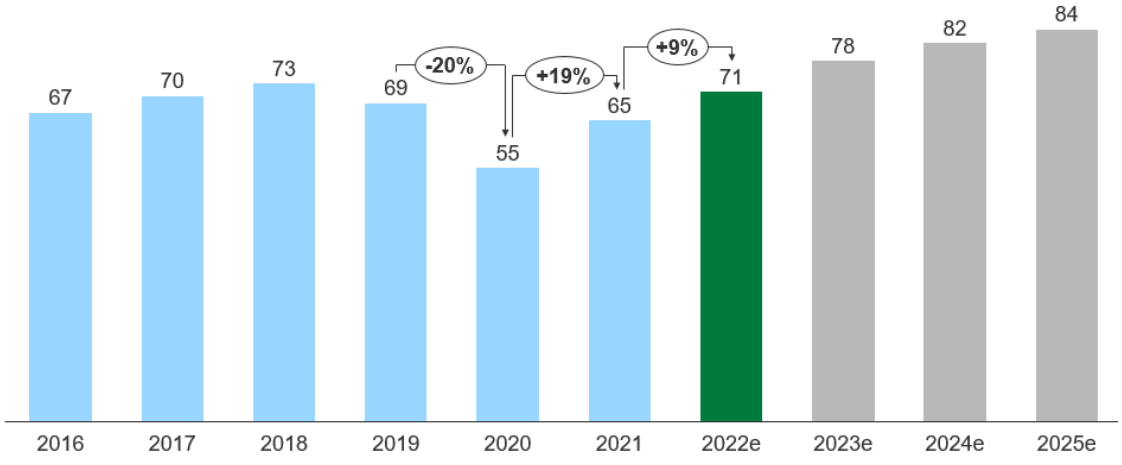
Advancing energy-efficient and clean manufacturing

+GF+

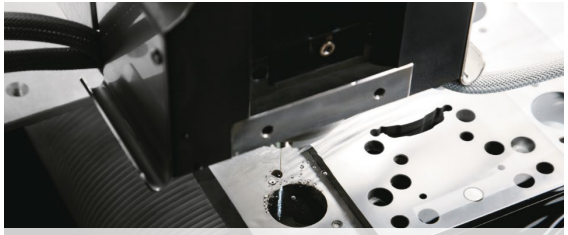
Global machine tool market is back to growth

Source: Cecimo

Global Machine Tool Consumption Forecast 2016-2025e
in EUR billion



Our comprehensive technologies …



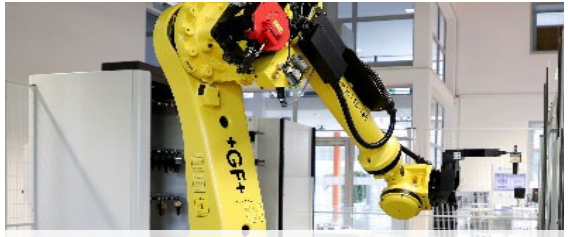
AgieCharmilles
Wire-cutting, die-sinking and hole-drilling EDM solutions and Laser texturing

Mikron Mill
High-speed, high-performance and high-efficiency Milling technologies

Microlution
Specialized in femtosecond Laser for hole-drilling and micro-cutting in a wide range of industries

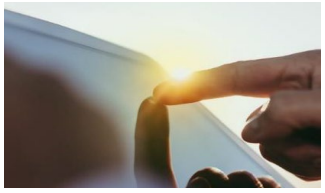
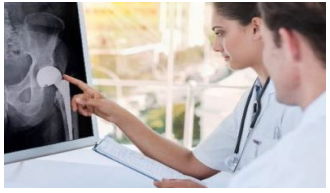
Liechti
Leader in five-axis airfoil machining solutions for the turbine industry

Step-Tec
High-end motor Spindles and subassemblies



System 3R
Productivity-boosting Automation, Tooling and Software systems

… benefit our key segments

	Aerospace and Energy	Automotive	ICT & Electronics	Medical	Packaging
					
Applications	▪ Engine components ▪ Aero structures, equipment systems	▪ Motor, batteries (electric, hybrid cars) ▪ Lighting, interiors, connectivity, motorsport	▪ Connectors, optical systems, smartphones ▪ Semiconductors	▪ Consumables ▪ Instruments ▪ Orthopedics	▪ Food & beverage ▪ Cosmetics
Accessible market	▪ 3 – 4 bn USD	▪ 2 – 3 bn USD	▪ 5 – 6 bn USD	▪ 2 – 3 bn USD	▪ 1 – 1.5 bn USD
Growth	▪ **New comers' order intake, business jets** ▪ **Fuel efficiency**	▪ **New mobility** ▪ **High efficiency, complex parts**	▪ **Everything connected** ▪ **Embedded intelligence**	▪ **Ageing population** ▪ **Rising healthcare standards**	▪ **Covid19 effects** ▪ **Less plastic, less painting**

Sources: Georg Fischer estimates

For the promising Aerospace sector, e.g. in China …

Source: COMAC, China Investment Industry Research Institute, Georg Fischer estimates

More than **9'080 aircrafts** needed over the next 20 years

Some aero-engine models gradually put into **serial production**

Lunar exploration & research station by 2035

Chinese addressable **machine tool** market for aerospace estimated to grow **+10-15% per year** for the next 5-10 years

… we help improve fuel efficiency

Objective: Higher fuel efficiency

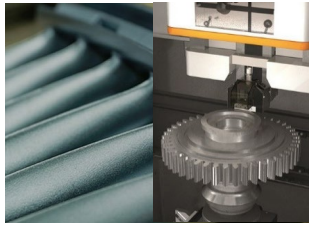
E.g. Aero engine

Higher temperatures

Liechti
Inconel blisks milling

ML
Micro drilling

EDM
Seal slot* + CUT 200 Dedicated



Lightweight design

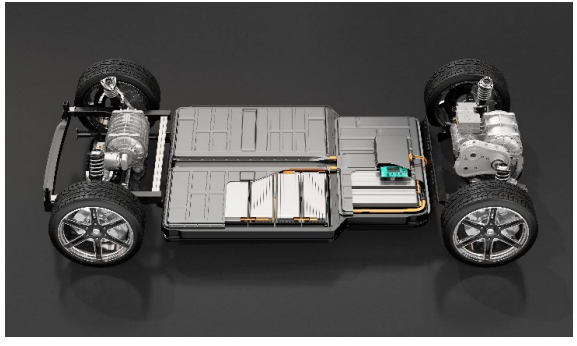
AM
Combustor components

AM
Turbine rear vane

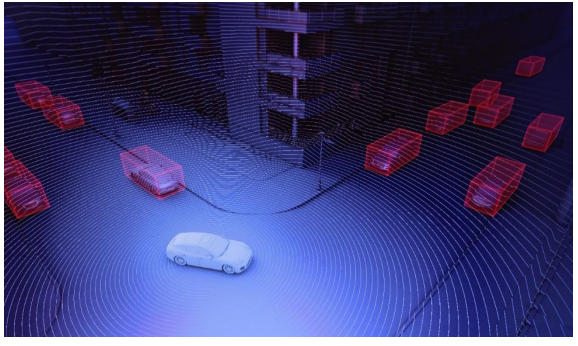
EDM
CUT AM

For the changing Automotive industry …

Source: CWIEME Global, IHS Markit, Georg Fischer estimates



~22 million electric **motors** produced in 2021 for hybrid / electric vehicles



More **electronics** and **optics** for intelligent and autonomous driving

Upgraded "traditional" components such as **central consoles**, **lighting** or **tires**

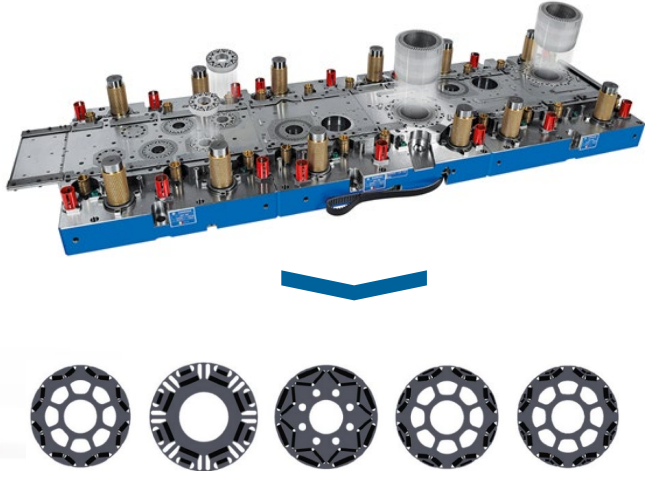
Global addressable **machine tool** market for automotive estimated to grow **+3-8% per year** for the next 5-10 years

… we support E-mobility with our very high precision

GF Machining Solutions
CUT X Wire EDM

WEDM
Progressive stamping tool – fine stamping
for stacked lamination coils

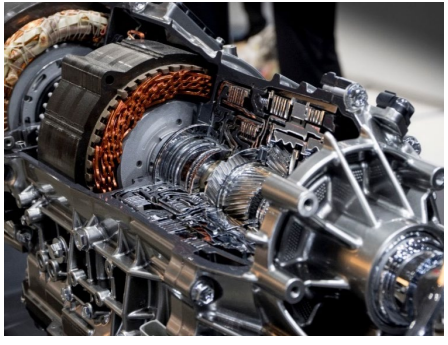
Larger size and higher precision



Source: EuroGroup Laminations / Corrada
("Progressive Carbide and Steel dies")

Objective:
Improved motor efficiency

E.g. Electric vehicles motors

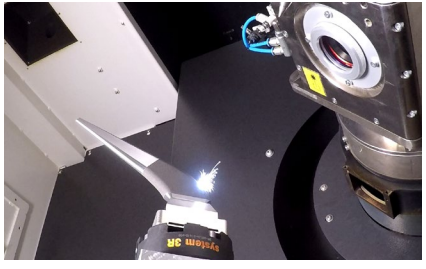


For the highly innovative global Medical market …

Source: MedTech Europe, Georg Fischer estimates

More than **38'000 patents** in 2020 for medical technology worldwide

Next product generation every **18 to 24 months** on average



Innovative manufacturing technologies including **3D printing** or **functional surfaces**

Large and growing segments – E.g. **Orthopedics**, with **USD 45 billion** and more than **+6% / year**

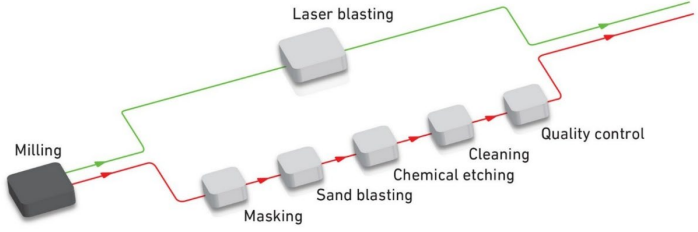
Global addressable **machine tool** market for medical estimated to grow **+5-10% per year** for the next 5-10 years

… we enable cleaner and repeatable manufacturing

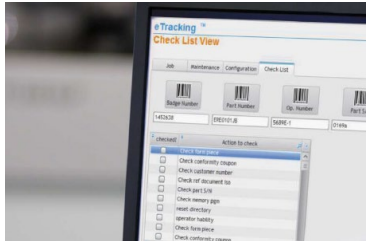
Objective: Clean and repeatable manufacturing
E.g. **Hip implant with functional surfaces** (osseo-integration and anti-bacterial)

Source: Georg Fischer

Digital process with no surface residue
Laser replacing sand blasting + chemical etching + cleaning



Full traceability
Key manufacturing data tracked



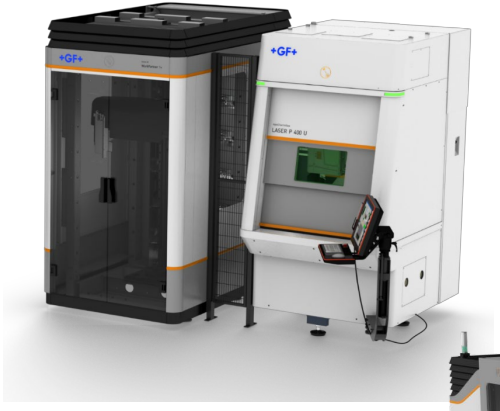
Automation is key for all applications

Maximize productive time, keep stable processes

Availability of skilled labor

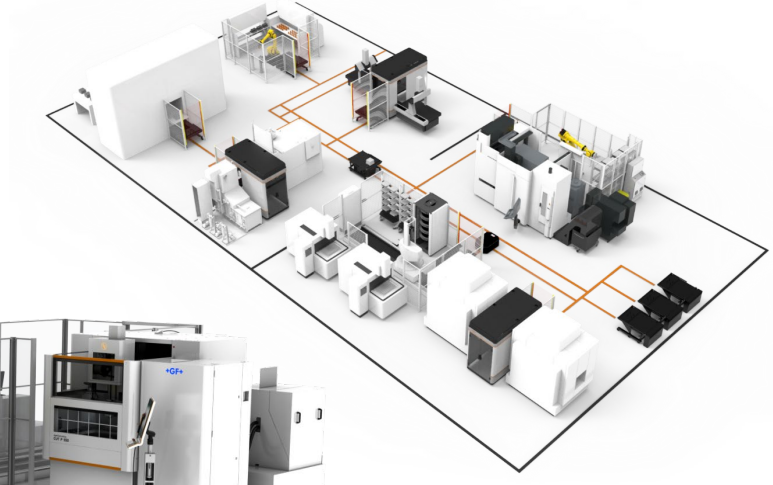
GFMS has a unique and forward looking offering

From machine…



…to cell…

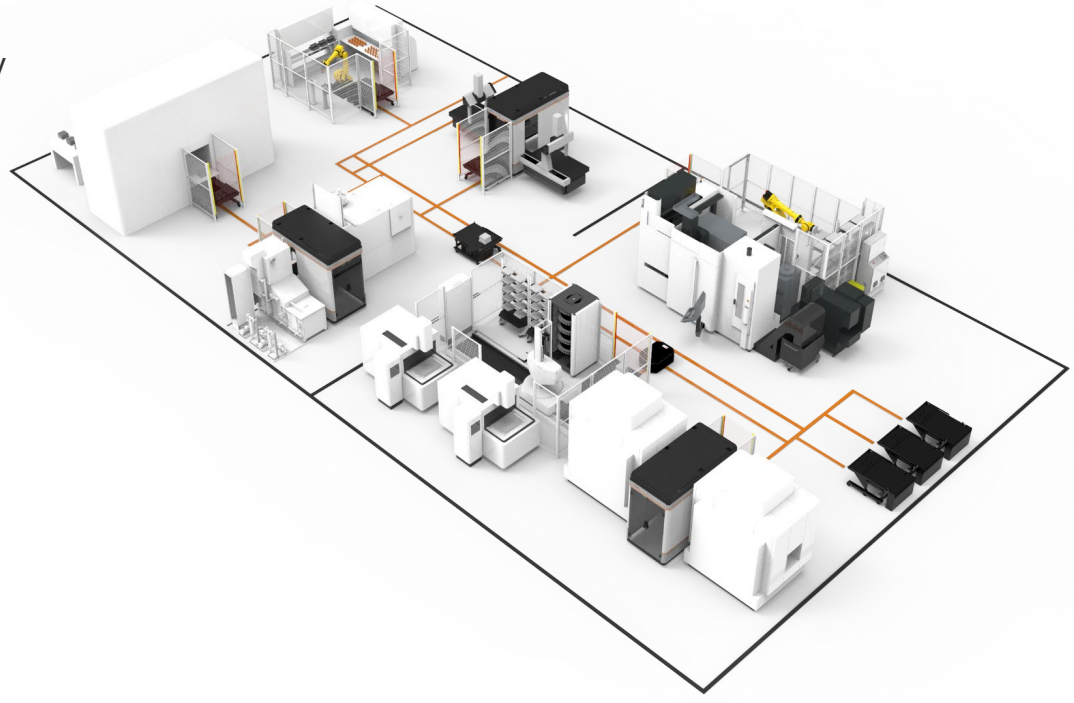
…to factory automation



GF Machining Solutions showcase

High accuracy – automated processes
The factory of the future for a better productivity

Andrea Fritzsch
Head of Marketing,
Communication and Business Development



A micron in the factory of the future

Andrea Fritzsch

What is this?

THE RELATIVE SIZE OF PARTICLES

From the COVID-19 pandemic to the U.S. West Coast wildfires, some of the biggest threats now are also the most microscopic.

A particle needs to be 10 microns (µm) or less before it can be inhaled into your respiratory tract. But just how small are these specks?

Here's a look at the relative sizes of some familiar particles ↘

Processing Power x 100.000

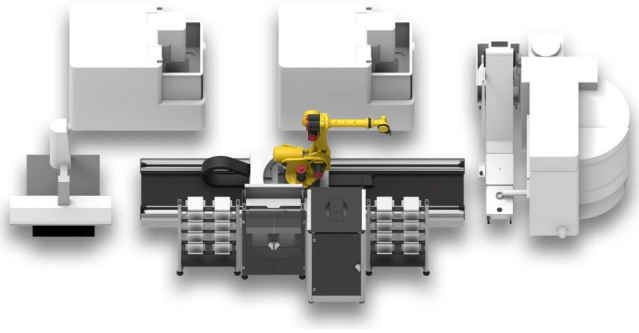
Increased precision for medical applications

Some customers already reach this level of precision with:

1. **Dedicated Experts**
2. **High-End Machines**
3. **Controlled Environment**

Competition

How do we solve these challenges?

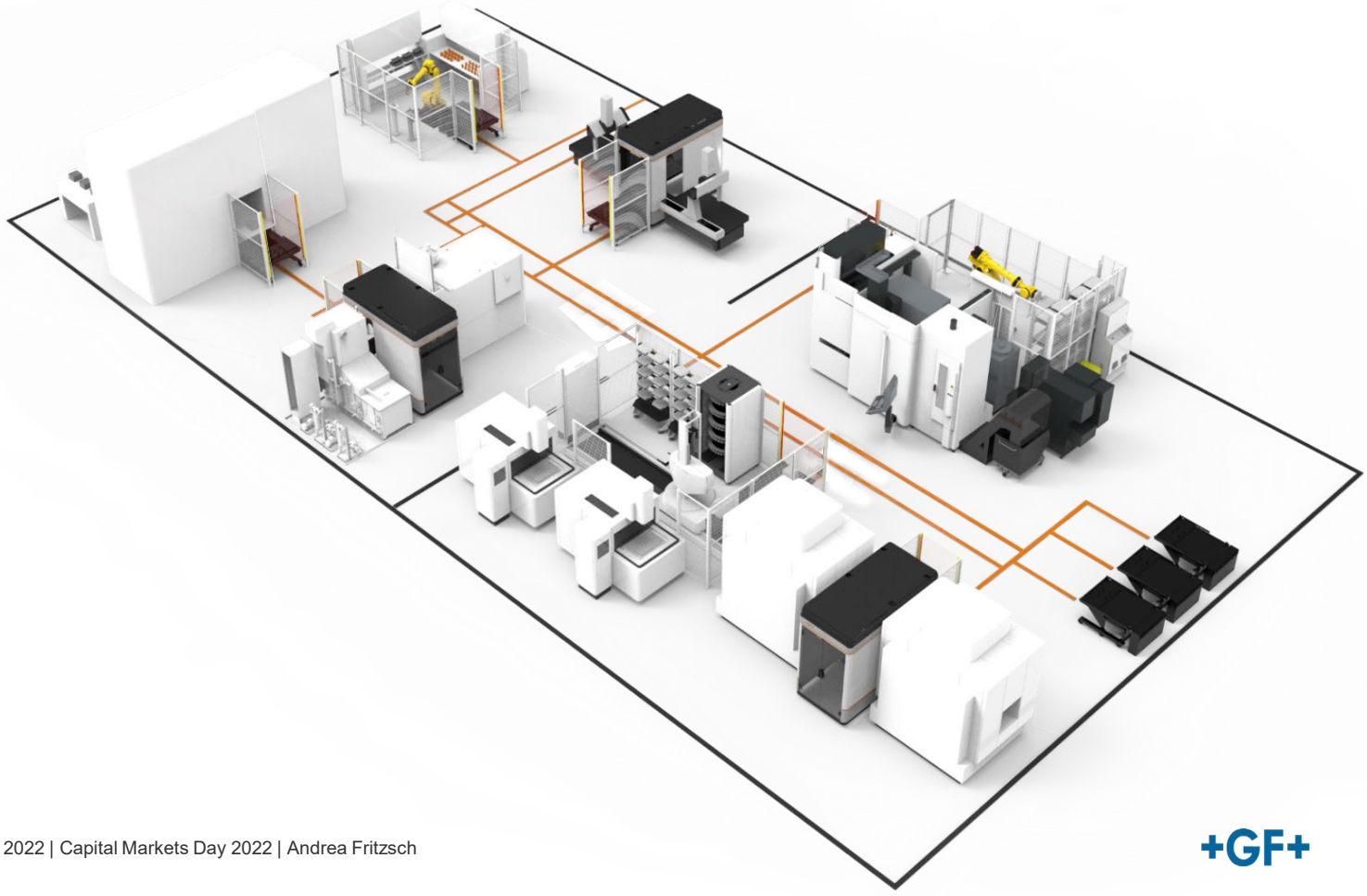


Customer video

SCHAEFFLER

Factory of future

Automation in the factory of the future



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