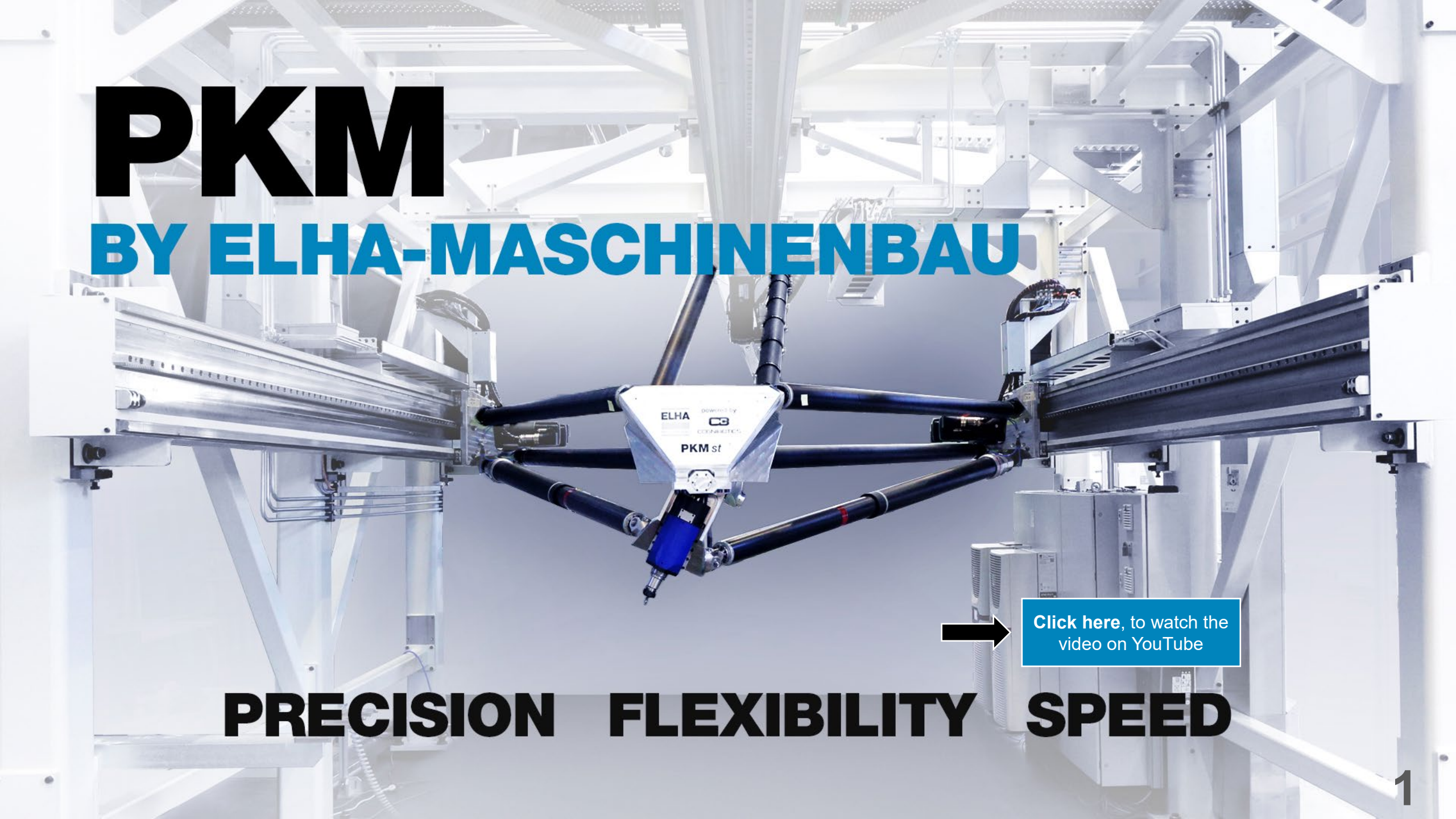
PKM

BY ELHA-MASCHINENBAU



Click here, to watch the video on YouTube

PRECISION FLEXIBILITY SPEED

WELCOME

ELHA MASCHINENBAU

COGNIBOTICS

Big workspace: width = 3m, height= 2m, length= no limit

ELHA today

Employees
about 240

Annual turnover
about 50 Mio. €

Locations
2x in Hövelhof

Turn-Key Solutions

Cognibotics today

A deep-tech growth company

- Spin off from Lund Technical University to commercialize a new idea that radically enhances robot productivity and makes digital twins a reality
- Targeting $3B opportunities in the SME cobots, automotive, aerospace and logistics markets
- HQ in Lund, Sweden, and a subsidiary in New York, USA Sales representation in Sweden, Germany and North America
- Net revenues 25 MSEK (19), which corresponds to an annual growth of 32% (41%)

COGNIBOTICS

A Team Passionate about Robotics!

- Commercial team with prior successes in launching deep-tech automation products
- Hand-picked robot and Machine Learning experts. Many are recognized thought leaders and innovators in robotics
- 200+ years of combined experience from leading robot companies and research
- Cost-effective organization with 35 FTE and 5 consultants; 28 MSc, 12 PhDs

ELHA and Cognibotics

We established a partnership between ELHA and Cognibotics to offer unique innovative manufacturing solutions.

ELHA as a settled machine tool builder and Cognibotics as an expert for robot engineering, combine their competence fields to breakthrough conventional trends.

Our philosophy is to develop, together with our customers, process solutions for the manufacturing environment of the future.

PKM

energy efficient

modular

configurable

precision

dynamic

flexible

We identified that actual manufacturing requirement demand for solutions that are flexible and adaptable to a more agile manufacturing environment

State of the art robotic solutions for machining are flexible and have a lower footprint compared with CNC Machines, however the process reliability is still much lower compared to traditional CNC Machines.

We develop a solution that combine the best characteristics of both - flexibility of a robot and the stiffness of a CNC machine.

Stiffness comparison

Stiffness (TCP):
0.1 - 0.2 N/µm

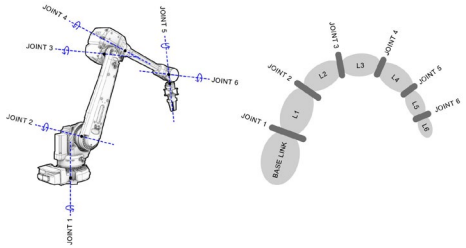
Stiffness (TCP):
5 - 10 N/µm

Stiffness (TCP):
30 - 35 N/µm

› **Closes the gap between serial robots and conventional machining centres**

What is Full PKM?

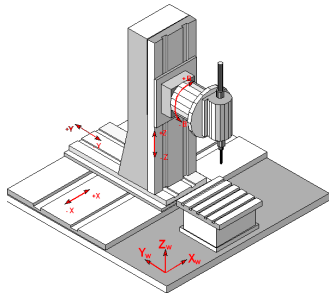
Serial Technology



Robot

- High Dynamic
- High Flexibility
- Low Footprint
- Low Power consumption

- Low Accuracy
- Low Stiffness
- Singularity issues

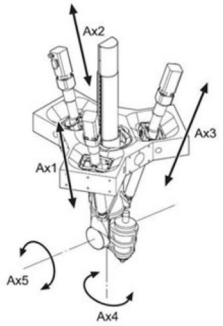


Machine Tool

- High Accuracy
- High Stiffness

- Low Dynamic
- Low Flexibility
- High power consumption
- High footprint & mass

Parallel Technology



Common System

(3-axis parallel, 2-axis Serial)

- High Dynamic
- High Accuracy

- Moderate Flexibility
- Moderate Stiffness
- Moderate workspace

- Singularity Issues

Full Parallel Technology

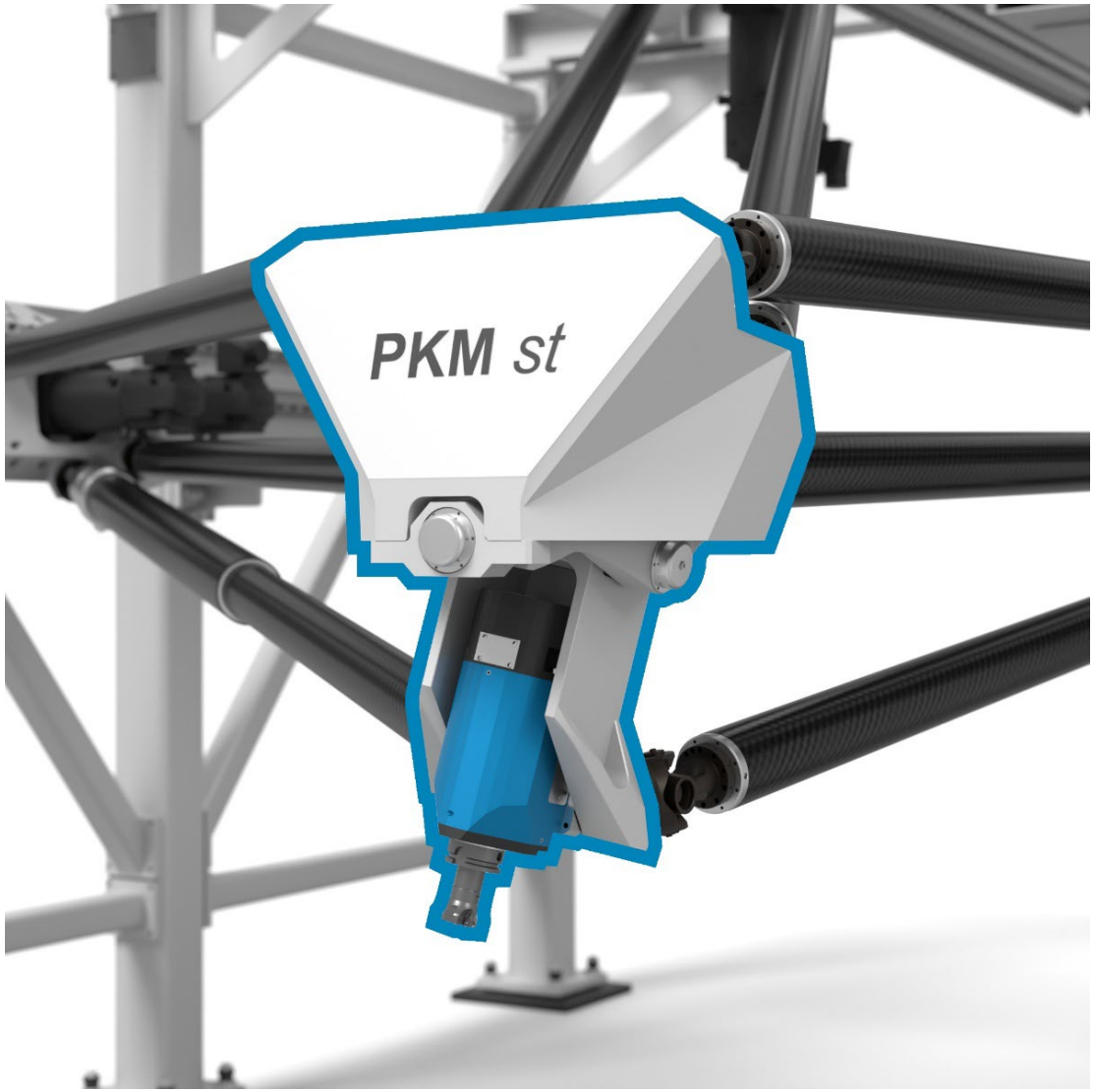
Full PKM

(5-axis PKM)

- High Dynamic
- High Flexibility
- Huge workspace
- Low Footprint
- Low power consumption
- No Singularity Issues

- Moderate Accuracy
- Moderate Stiffness

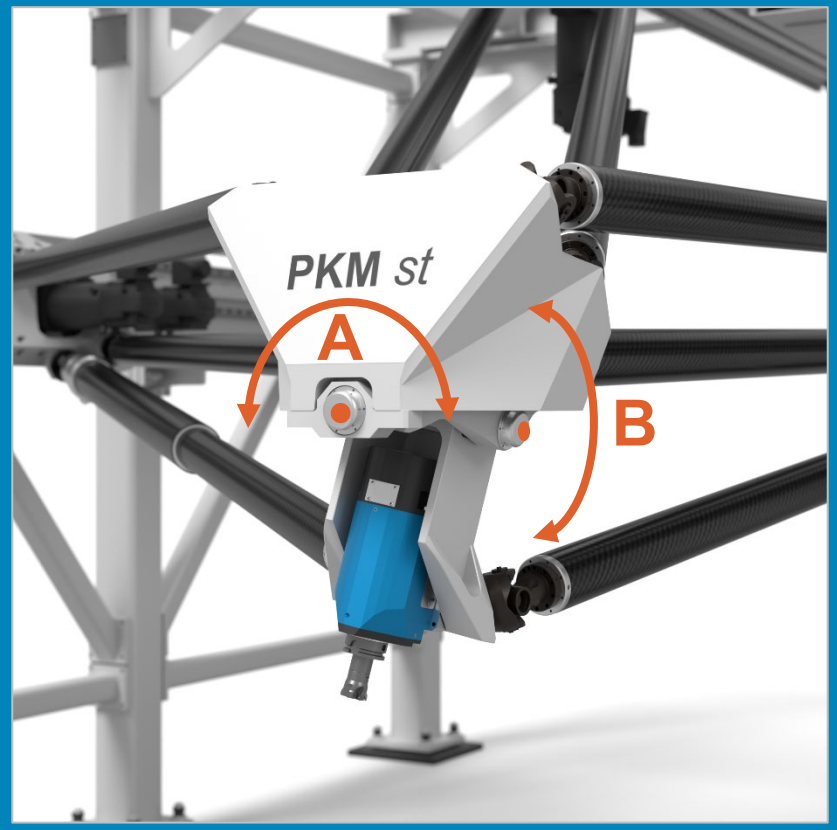
Parallel Kinematic Module PKM



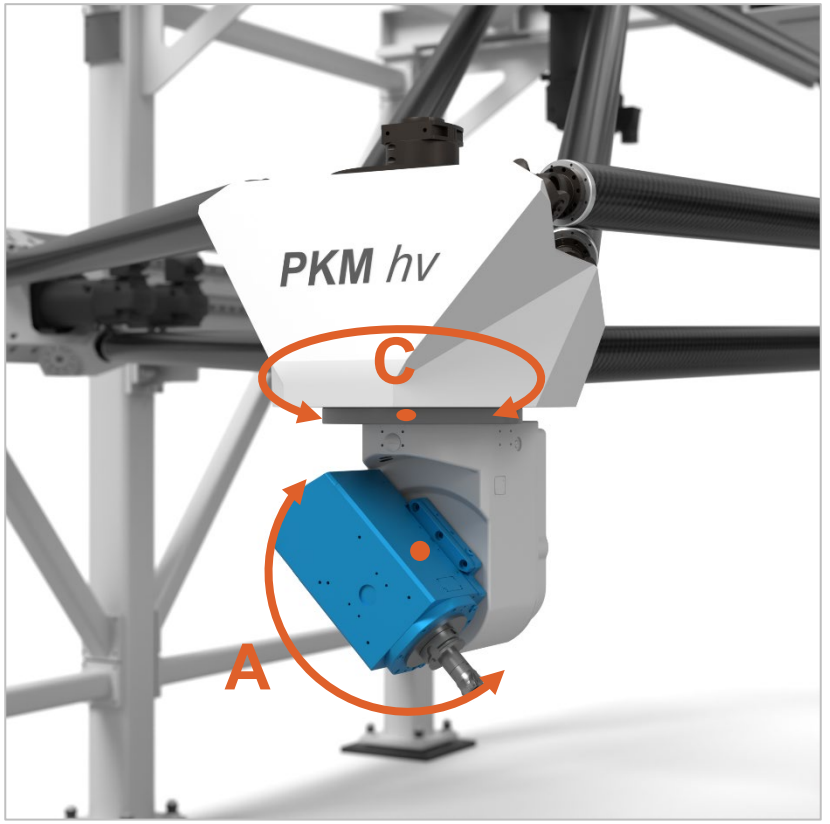
System features:

- Up to **20x** less moving mass
- Speed up to **170 m/min**
- Acceleration up to **2,5g**
- Repeatability up to **5 µm**
- Tool path accuracy up to **40µm**

Available Heads



Spindle power
for both heads
up to 20kW
with HSK 63



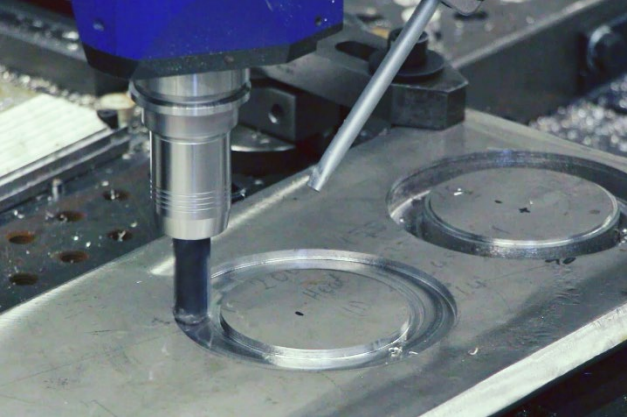
PKM-*st* (A-B head):

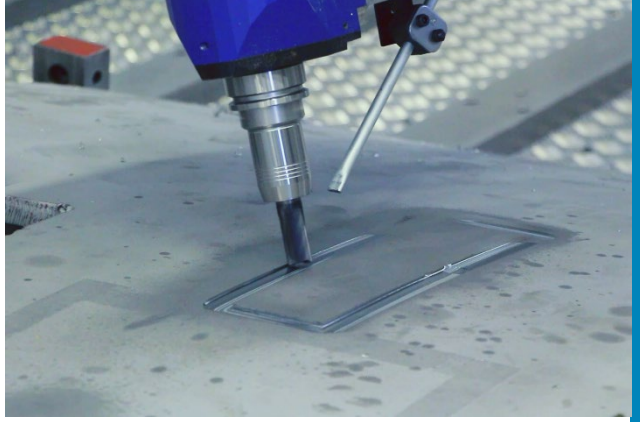
- A-Axis: +/-50°
- B-Axis: +/-50°

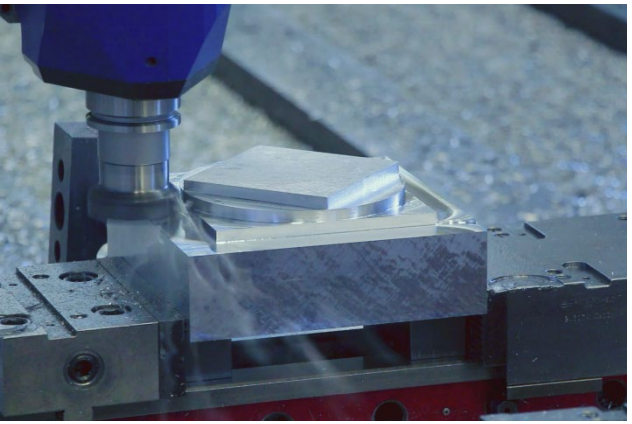
PKM-*hv* (C-A head):

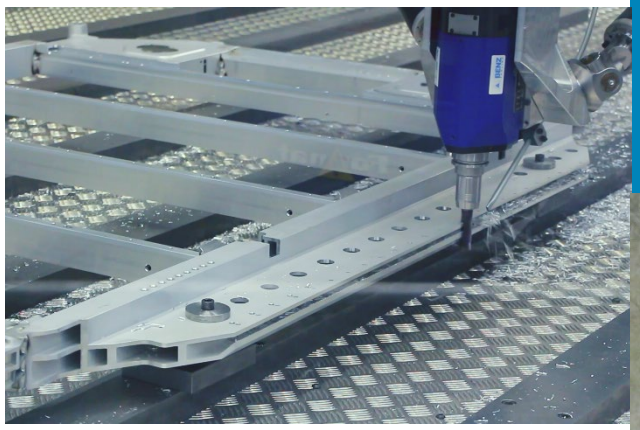
- A-Axis: +/-120°
- C-Axis: +/-360°

Which processes can PKM support?









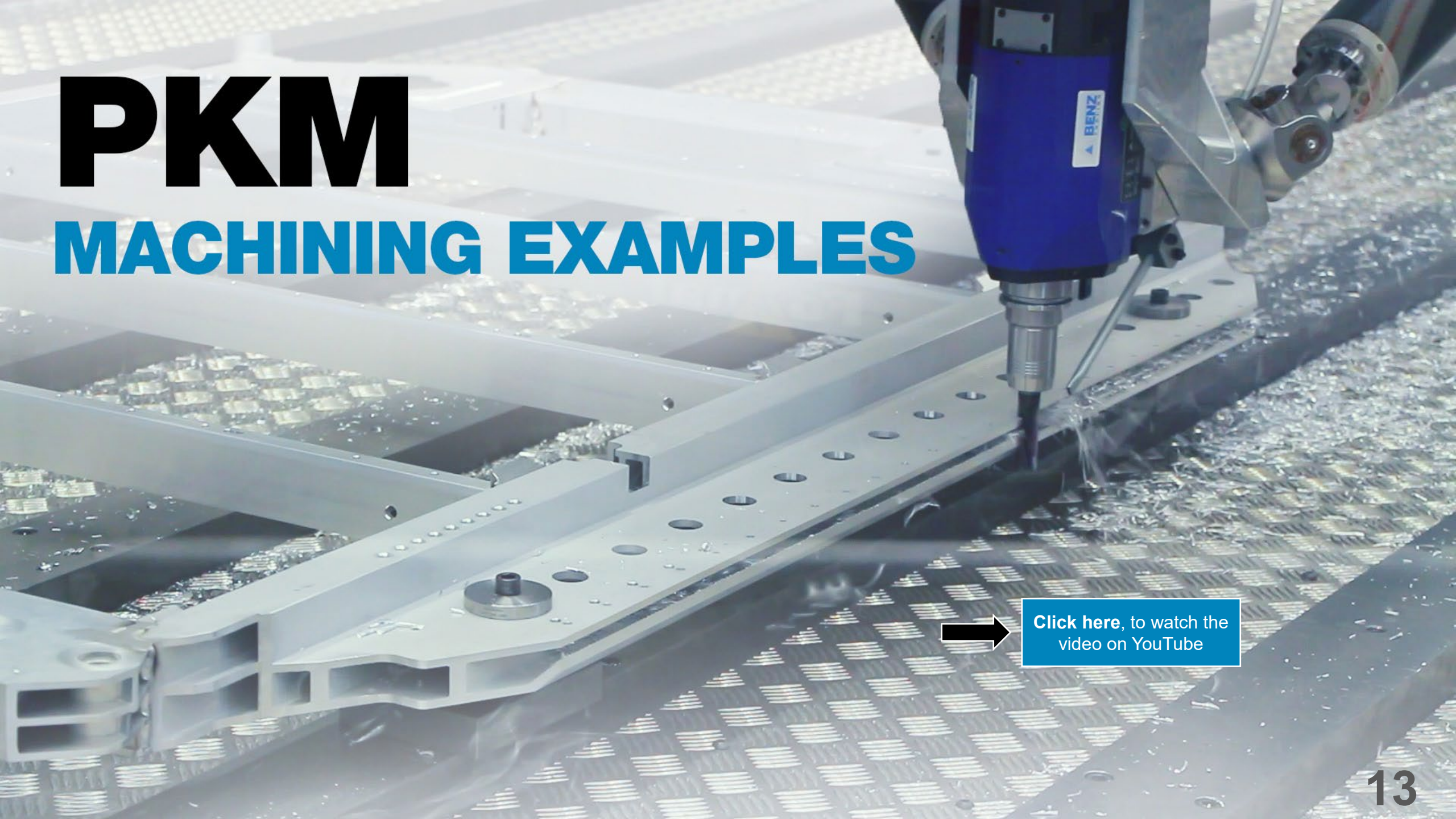
- Milling
- Drilling
- Deburring
- Chamfering

- Friction stir welding
- Laser welding
- Laser cutting
- Plasma cutting
- EHLA (extreme high speed laser additive, LMD)
- CFRP fiber laying

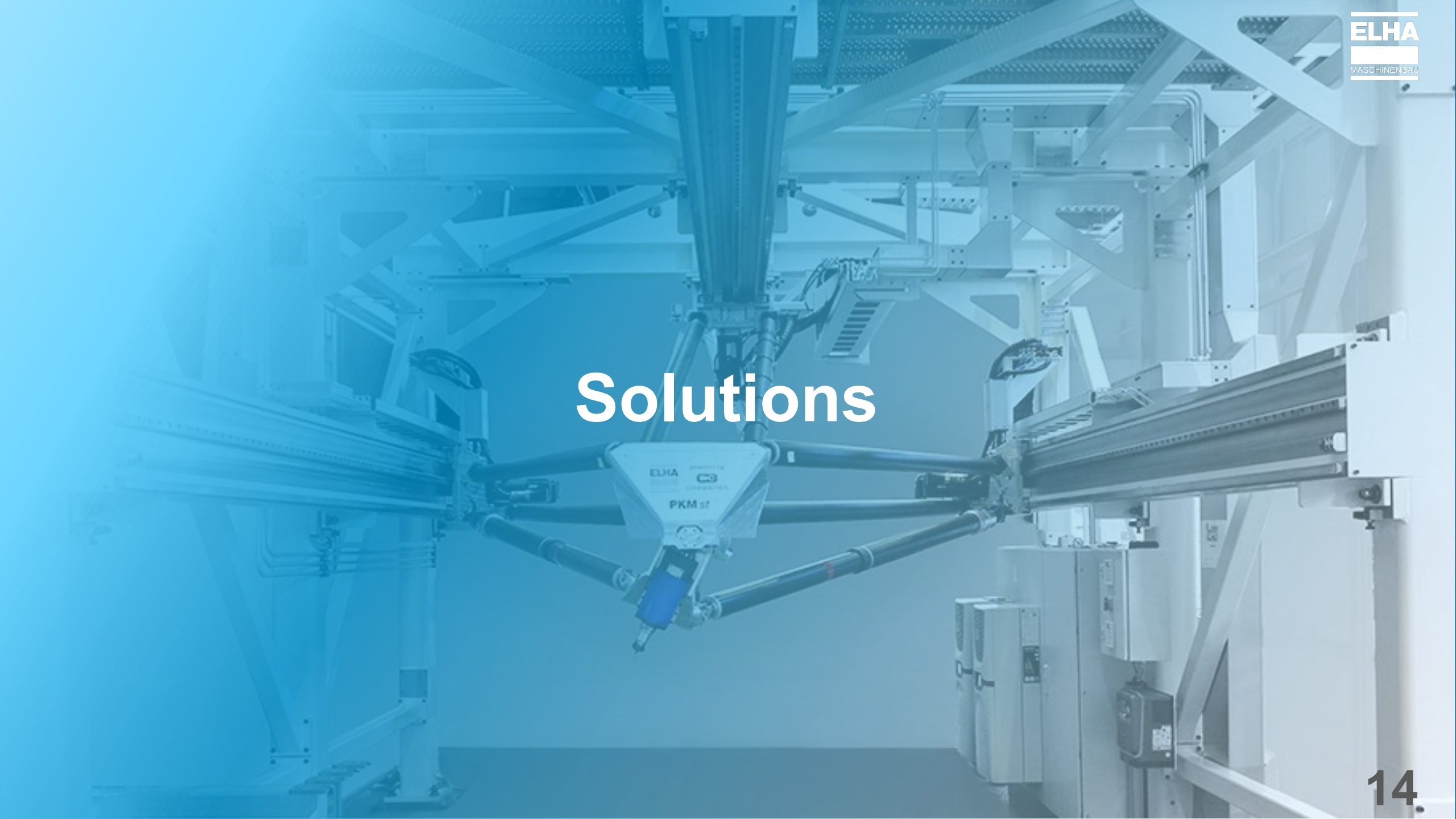
Thread milling in GRP

PKM

MACHINING EXAMPLES



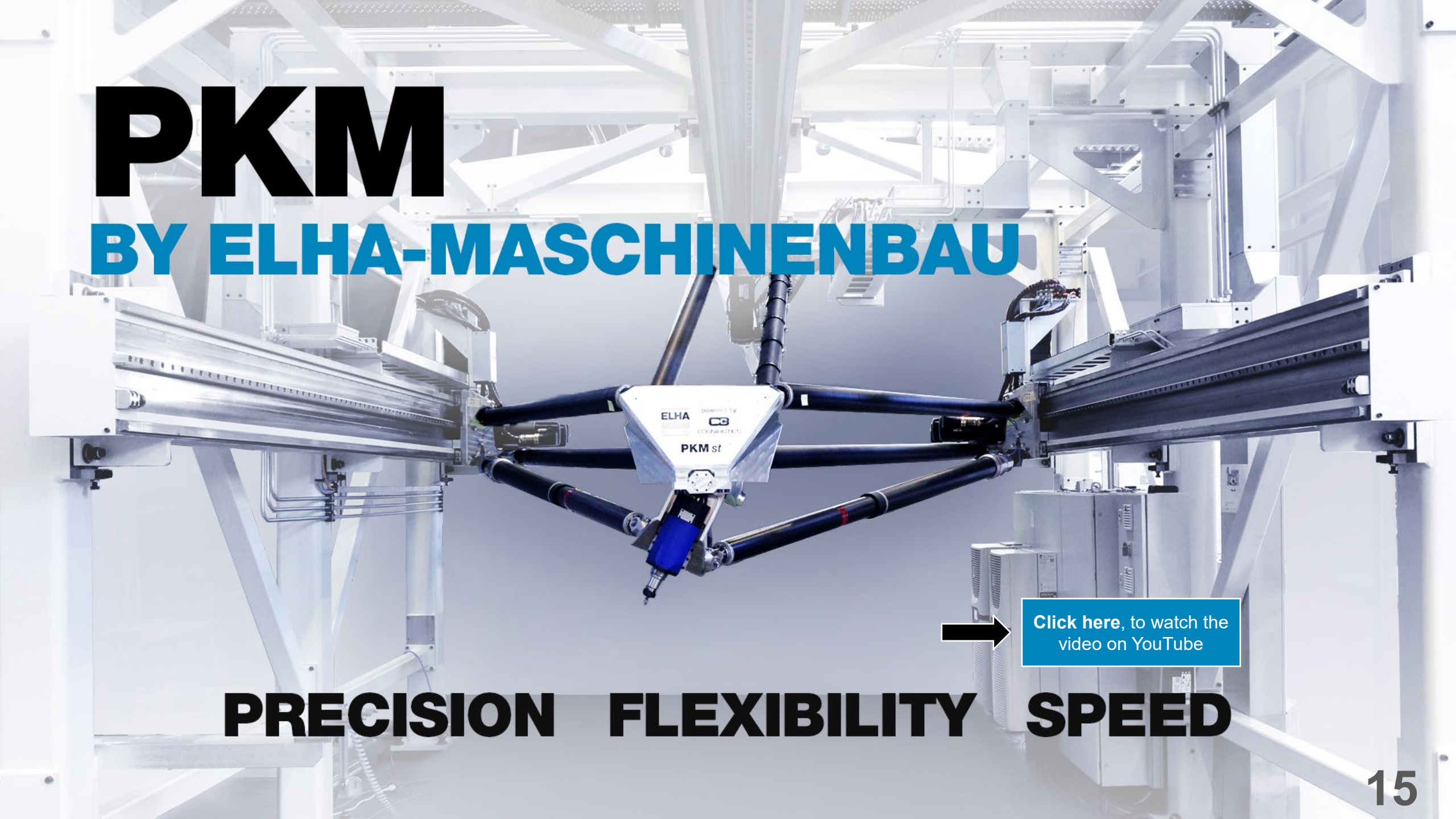
Click here, to watch the video on YouTube



Solutions

PKM

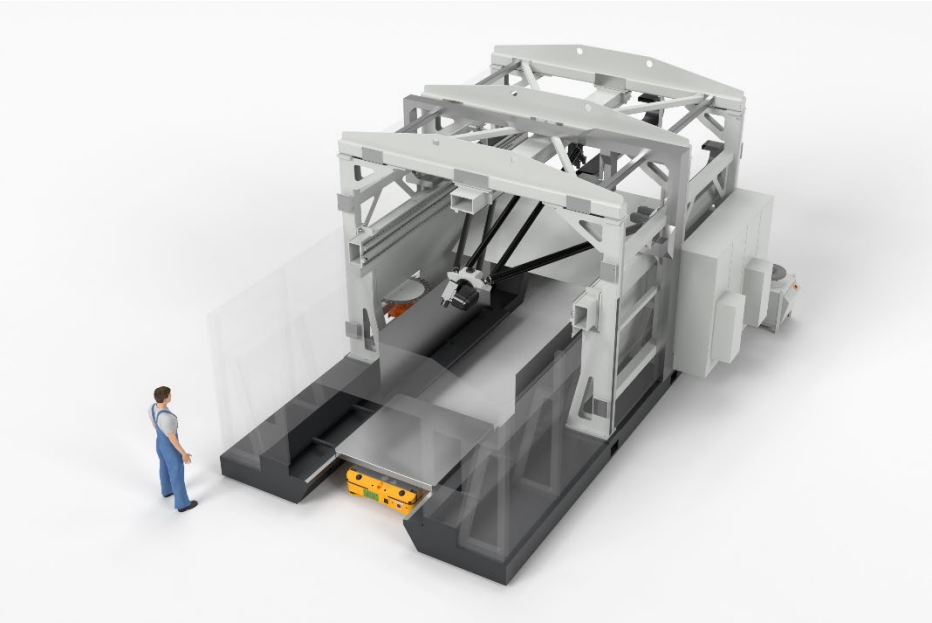
BY ELHA-MASCHINENBAU



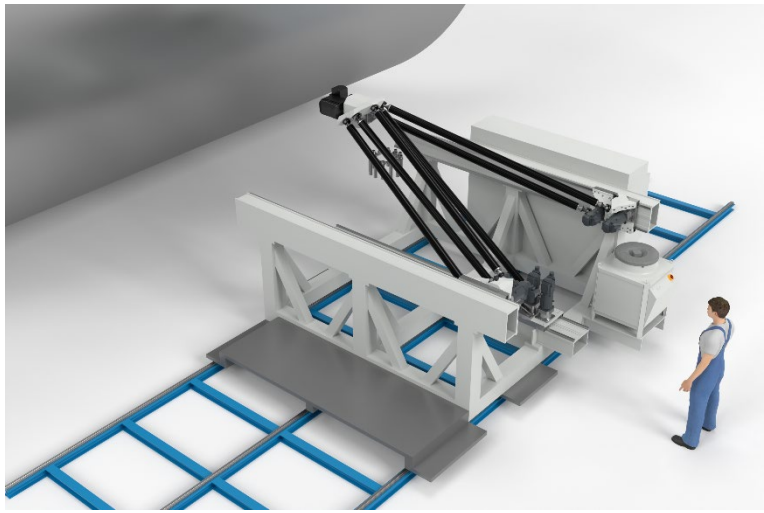
Click here, to watch the video on YouTube

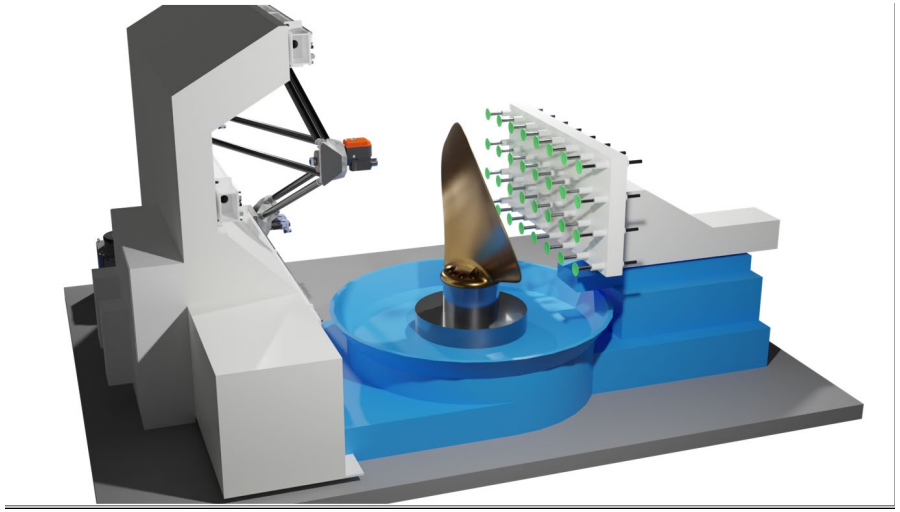
PRECISION FLEXIBILITY SPEED

Solutions for EV

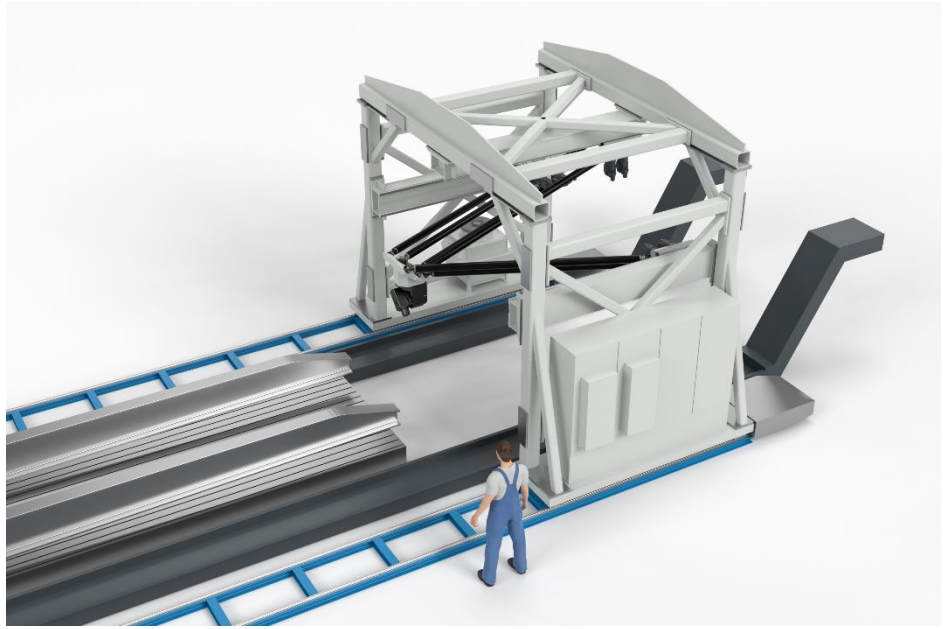


Solutions for Aerospace & Marine





Customized Solutions



Advantages of PKM

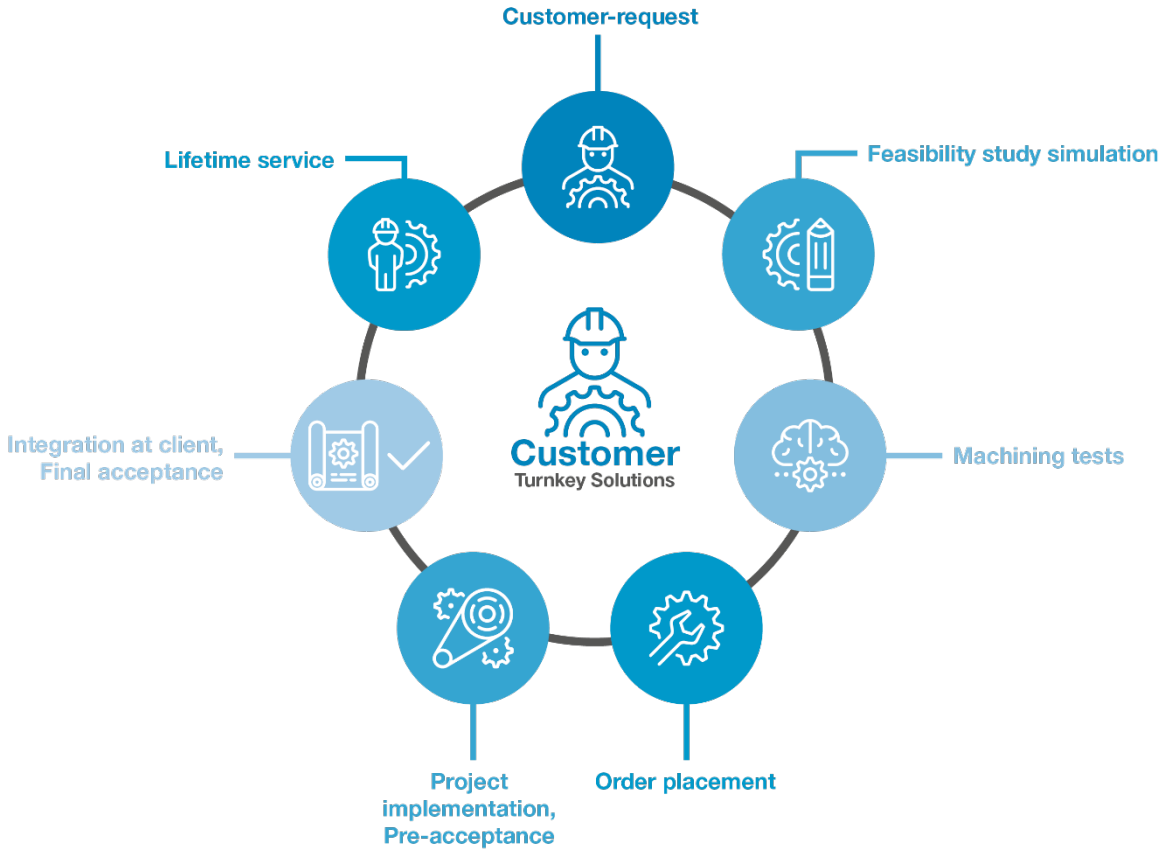
- **Large working range**
  - Standard X-axis range is 3m. Expandable in modules per 2m to unlimited
- **Accuracy**
  - Same accuracy in the entire workspace
- **Multiple Applications**
  - The tool platform and the machine surroundings can be configured for various applications
- **Ease of programming**
  - Programming as a conventional 5-axis CNC machine
  - Standard G-Code programming
  - No singularity with SigmaTau kinematic
- **Simplified structure**
  - No more mechanical components than strictly necessary
  - Less downtime due to less wear-prone components and easy mechanical repair
- **Ease of setup**
  - Easy workpiece changing
  - Open workspace out of kinematic area
- **Ease of configuration**
  - Vertical, Horizontal as well as inline and mirrored machining is possible

- **Less environmental footprint**
  - No Foundation, less mechanic components, low steel/stiffness ratio etc.

- **Less power consumption (Weight/stiffness ratio)**
  - Designed to reach the maximum stiffness with lowest weight
  - Up to 20 times less moving mass compared to classic machine tools
  - Designed for High Speed/Feed machining:
    - Less depth of cut (Less power consumption)
    - High Material Removal Rate

- **Smart software solutions**
  - Agile machine calibration and compensation.
  - With help of a laser measurement system the machine automatically generates a point cloud in the workspace.
    By implementing machine learning methodologies, the kinematic algorithm determines the machine geometry and compensates for orientational deviations.
    As a result a repeatability of 5µm and path deviation of less than 40 µm in the entire workspace volume will be achieved.

Turnkey solution



Together with our customers and partners we provide turnkey solutions including:

- Process and tooling development
- Solutions for partially or fully automated process

INTERESTED?
CONTACT US NOW!

info@elha.de

+49 (0) 5257 508 0