FM PRODUCTION MODULES

FM 3+X    FM 3+X hd    FM 4+X h
Development background

From the early days of mass production for metal cutting workpieces until now there were a lot of improvements in production technology to maximize profitability. New work materials and optimized tool technology led to a dramatic reduction of cutting times over the years.

There was also a significant reduction of non-productive idle times in recent years due to improved machine tool technologies, but it didn’t keep pace at all with reduction of productive times. Especially for mass production parts which require a lot of different tools with short cutting times, such as for drilling or threading, this means a huge leak of total productivity.

This was a good reason for ELHA to work hard on a solution. As a result ELHA developed and established a brilliant machining concept which has sustainably revolutionized the metal cutting industry, especially for mass production applications.

Paradigm change

with a FM production module

- All required process tools are arranged inside the machining area at a fixed position
- Each tool has its own specific, optimized spindle size and drive by using multi spindle heads or turrets
- The worktable with clamped workpiece(s) moves from tool to tool; shortest chip-to-chip times
- No tool change within the process; no inaccuracy due to tool change
- Single/multiple part clamping & single/multiple spindle machining possible (depending on application)

Conventional machining

on a machining center

- Tool spindle changes tools for each different process
- Tool spindle moves from/to toward the workpiece

Ideal machining concept for:

- Small and mid lot sizes
- High number of different workpieces and work setup

Ideal machining concept for:

- Mass production of more than 100k of same or similar workpieces per year
- Small & midsize workpieces
- Limited quantity of various workpiece types
- Moderate number of different tools and clampings
- Optimal for light metals, steel, forging and casting materials
**Multi spindle heads**

Multi spindle heads are the process specific key components for maximum productivity.

**Drum type turret**

Higher flexibility due to increased capacity of different tools up to max. 128 direct driven tools.

**Hydrostatic ram**

The hydrostatic ram ensures highest rigidity and damping to achieve best performance and accuracy even for heavy cutting operations.

**Double feed drives**

For powerful, highly accurate and dynamic feeds as well as for fast rapids to reduce idle times.

**Work fixture**

Process specific, hydraulic automatic fixtures for single or multiple workpiece clamping, designed by ELHA.

**Spindle fine adjustment**

Easy, quick and highly accurate adjustment of the spindles for highest work precision.

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**Customized components for:**

- **Maximum productivity**
  - ...by utilization of process optimized multi spindle heads only

- **Maximum flexibility**
  - ...by utilization of up to four drum type turrets and 128 direct driven tools

**Optimized productivity and flexibility**

...by combination of multi spindle heads and drum type turrets

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**APPLICATIONS**

- **die cast aluminium**
  - complete machining in one fixture position with 1 FM 3+X
  - 2 workpieces simultaneously

- **chilled aluminium casting**
  - complete machining in two fixture positions with 2 FM 3+X
  - 2 workpieces simultaneously

- **steel casting**
  - partial machining in one fixture position
  - 3 workpieces simultaneously

- **die cast aluminium**
  - complete machining in one fixture position with 1 FM 3+X
  - 2 workpieces simultaneously

- **forged steel**
  - complete machining in two fixture positions with 3 FM 3+X
  - 4 workpieces simultaneously

- **cast iron**
  - partial machining in one fixture position with 1 FM 3+X
  - 2 workpieces simultaneously

- **extruded aluminium**
  - complete machining in two fixture positions with 2 FM 3+X
  - 2 workpieces simultaneously

- **GGG 40**
  - partial machining in two fixture positions with 2 FM 4+X
  - 2 workpieces simultaneously

- **casting**
  - complete machining in one fixture position with 1 FM 3+X
  - 2 workpieces simultaneously

- **GGG 70**
  - complete machining in one fixture position with 1 FM 3+X
  - 2 workpieces simultaneously

- **die cast aluminium**
  - complete machining in three positions on 3 FM 3+X
  - 2 workpieces simultaneously

- **steel casting 1.4848**
  - complete machining in one fixture position on 1 FM 3+X
  - 2 workpieces simultaneously

- **steel casting**
  - partial machining in one fixture position
  - 3 workpieces simultaneously

- **chilled aluminium casting**
  - complete machining in two fixture positions with 2 FM 3+X
  - 2 workpieces simultaneously

- **steel**
  - complete machining in one fixture position on 3 FM 3+X
  - 4 workpieces simultaneously

- **casting**
  - complete machining in one fixture position with 3 FM 4+X
  - 2 workpieces simultaneously

- **GGG 40**
  - partial machining in two fixture positions with 2 FM 4+X
  - 2 workpieces simultaneously
**MACHINE TYPES**

**FM 3+X**
- **our bestseller**
- The FM 3+X is the most popular model and first choice for small and midsize workpieces in light metals and steel materials.

**FM 3+X hd**
- **for heavy machining**
- Due to double feed drives and hydrostatic ram the FM 3+X hd is the best solution for heavy cutting operations in steel, forging, casting or other tough materials.

**FM 4+X h**
- **for large machining**
- The large and rigid machine design of the FM 4+X h ensures best performance on midsize and large workpieces even for tough materials.

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th><strong>TRAVELS</strong></th>
<th><strong>FM 3+X</strong></th>
<th><strong>FM 3+X hd</strong></th>
<th><strong>FM 4+X h</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>X-axis (cross)</td>
<td>mm</td>
<td>400</td>
<td>500</td>
</tr>
<tr>
<td>Y-axis (vertical)</td>
<td>mm</td>
<td>1000</td>
<td>1200</td>
</tr>
<tr>
<td>Z-axis (ram)</td>
<td>mm</td>
<td>500</td>
<td>400</td>
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<table>
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<tr>
<th><strong>FEEDS</strong></th>
<th><strong>FM 3+X</strong></th>
<th><strong>FM 3+X hd</strong></th>
<th><strong>FM 4+X h</strong></th>
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</thead>
<tbody>
<tr>
<td>Speed</td>
<td>m/min</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>Acceleration (max.)</td>
<td>m/s²</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Feed force X / Y / Z (max.)</td>
<td>kN</td>
<td>15</td>
<td>20</td>
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<table>
<thead>
<tr>
<th><strong>ROTARY TABLE</strong></th>
<th><strong>FM 3+X</strong></th>
<th><strong>FM 3+X hd</strong></th>
<th><strong>FM 4+X h</strong></th>
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<tbody>
<tr>
<td>Diameter</td>
<td>mm</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Rotational speed</td>
<td>rpm</td>
<td>60</td>
<td>80</td>
</tr>
<tr>
<td>Clamping torque</td>
<td>Nm</td>
<td>1500</td>
<td>2100</td>
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<tr>
<td>Positioning accuracy</td>
<td>arcsec</td>
<td>±5</td>
<td>±5</td>
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<td>Indexing</td>
<td>degree</td>
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<tr>
<th><strong>SPINDLES</strong></th>
<th><strong>FM 3+X</strong></th>
<th><strong>FM 3+X hd</strong></th>
<th><strong>FM 4+X h</strong></th>
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</thead>
<tbody>
<tr>
<td>Max. power (S1-100%)</td>
<td>kW</td>
<td>20</td>
<td>37</td>
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<tr>
<td>Max. speed</td>
<td>rpm</td>
<td>20000</td>
<td>20000</td>
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<tr>
<td>Max. torque</td>
<td>Nm</td>
<td>200</td>
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<tr>
<th><strong>CONNECTED POWER</strong></th>
<th><strong>FM 3+X</strong></th>
<th><strong>FM 3+X hd</strong></th>
<th><strong>FM 4+X h</strong></th>
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<tbody>
<tr>
<td>Power requirement (3AC 400V / 50Hz)</td>
<td>kVA</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Compressed air</td>
<td>bar</td>
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<tr>
<th><strong>DIMENSIONS</strong></th>
<th><strong>FM 3+X</strong></th>
<th><strong>FM 3+X hd</strong></th>
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<tbody>
<tr>
<td>Width</td>
<td>mm</td>
<td>3050</td>
<td>3000</td>
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<tr>
<td>Depth</td>
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<td>3500</td>
<td>3570</td>
</tr>
<tr>
<td>Height</td>
<td>mm</td>
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<td>3500</td>
</tr>
<tr>
<td>Transportation height</td>
<td>mm</td>
<td>3200</td>
<td>3150</td>
</tr>
<tr>
<td>Workpiece loading height</td>
<td>mm</td>
<td>1100</td>
<td>1100</td>
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<tr>
<td>Weight incl. peripheral equipment</td>
<td>ca. t</td>
<td>14.5</td>
<td>18.5</td>
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</table>

Convincing by quality

More than 350 sold units are the impressive proof for highest customer satisfaction, best reliability and outstanding performance in automotive mass production.
ELHA-MASCHINENBAU Liemke KG

ELHA is a family-owned company known for customized machine tools and process solutions. Many industries in the metalworking industry trust ELHA's experience and competence in the development and realisation of highly productive machining processes as well as the design and manufacture of cutting machine tools and turn-key solutions.

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