



KOVOSVIT MAS
machine your future

WELDPRINT 5AX

Hybrid manufacturing

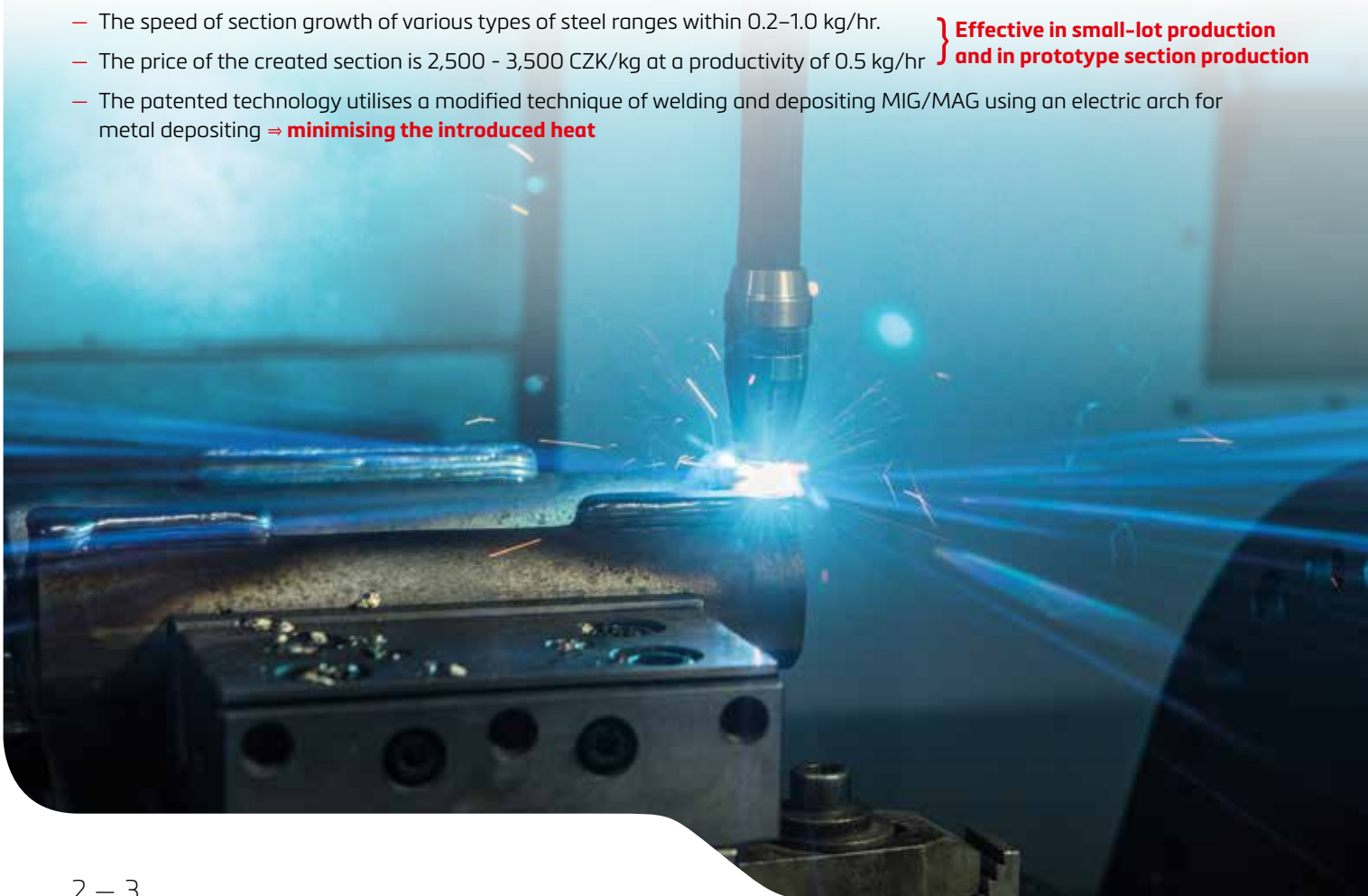


Main features of the machine

- Hybrid technology – combination of material addition and splinter machining
- The machine allows for creating, welding, and machining sections of weight up to 400kg with maximum dimensions Ø520×475mm
- The filler material is in the form of a wire using modified MIG/MAG technology
- The machine is in a five-axis design that is conceptually based on a vertical machining centre
- Change of the additive technology to the machining technology in 3.9 s
- Spindle with continuously variable speed (12,000 rpm or 18,000 rpm)
- Control system Siemens SINUMERIK 840Dsl including integrated additive technology
- The first developed machine of this concept in the CR

Technological capabilities

- Metal building-up and 5-axis continuous machining in one working space ⇒ **maximum productivity**
 - Production of high quality machine sections with minimum internal material defects and pores ⇒ **lower production costs**
 - Primarily, the machine is designed for applying special functions of depositing and welding of metals ⇒ **secondary use as a 5-axis vertical machining centre without any limitations**
 - Utilisation of standard (certified) wires and gas mixtures ⇒ **proven parameters of filler materials**
 - The speed of section growth of various types of steel ranges within 0.2–1.0 kg/hr.
 - The price of the created section is 2,500 - 3,500 CZK/kg at a productivity of 0.5 kg/hr
 - The patented technology utilises a modified technique of welding and depositing MIG/MAG using an electric arch for metal depositing ⇒ **minimising the introduced heat**
- } Effective in small-lot production and in prototype section production**



Industry and applications

- We can find application in the area of processing standard structural materials for regular engineering (machine-building, tool-making, energy equipment, military applications, transport equipment, prototype production, repair works)
- The main focus is especially on the processing of structural, stainless, fine-grained, and abrasion-resistant steels.
- The technology allows for processing also top materials, which are available in the form of welding wires

REPAIR WORKS



Clamping table



Track vehicle link

SHELL STRUCTURES



Thin-walled part
- final completion



Hollow section with an
internal structure

SECTIONS WITH INTERNAL CHANNELS (MOULDS)



Elliptical hyperboloid



Fork with a supporting
structure

DUPLEX MATERIALS



Track vehicle link



Track vehicle link

SUPPORTING STRUCTURE TECHNOLOGY



Supporting structure
- raster 14mm



Supporting structure
- raster 28mm



Supporting structure

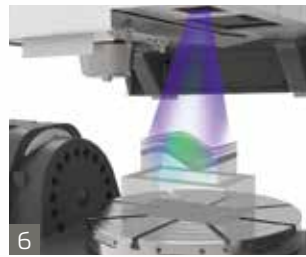
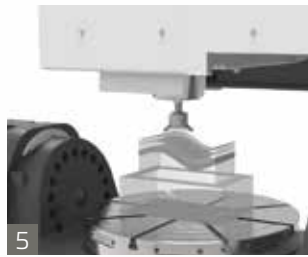
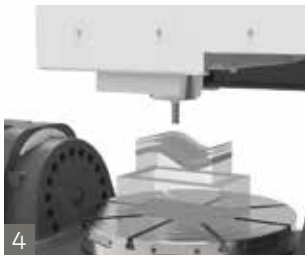
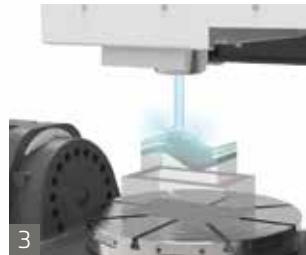
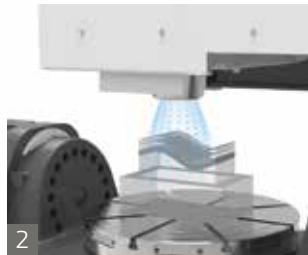
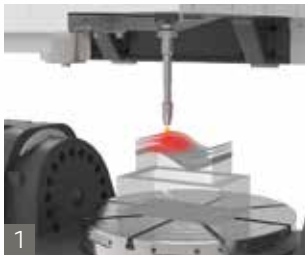
Aditive manufacturing

Technological advantages



- Low costs for section creation ⇒ **against the competing technologies utilising the principle of Laser Cladding, we are significantly less expensive**
- The new technology allows for viewing the semi-finished product as a dynamic, changing object
- Industry 4.0 ⇒ **the machine is ready for providing data for the corporate information system**
- Exclusion of the human factor during depositing and welding operations ⇒ **Securing the stability in section quality**
- Possibility of utilising the machine as a conventional machining centre, namely without limitations ⇒ **decreasing the risk of machine staying idle**
- Monitoring of the entire depositing and machining process ⇒ **100% trackability of the technology parameters, repeatable quality**
- Monitoring of the working space with a thermal camera ⇒ **deposit temperature checking**
- Monitoring of the working process with a camera ⇒ **image transmission to an integrated touch screen**
- Integrated touch screen ⇒ **monitoring, documenting, and analysing the process parameters**

Working principle



- 1 | Metal building-up
- 2 | Cooling
- 3 | Cleaning and drying
- 4 | Machining
- 5 | Mechanical cleaning
- 6 | Temperature checking

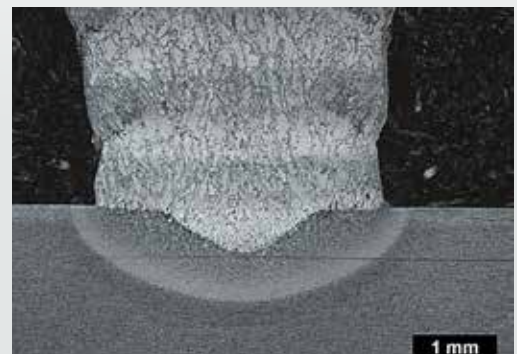
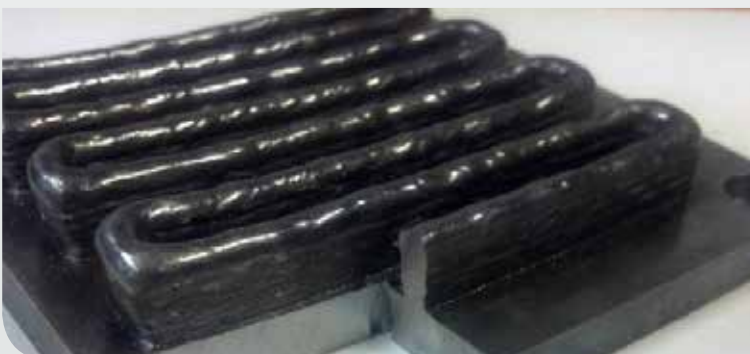
MATERIALS

- Stainless steel
- Inconel
- Titanium
- Abrasion-resistant steel
- Fine-grained steel
- Tubular steel
- Aluminium alloys



METALLURGY

Characteristics G3Si1		Standard material	WELDPRINT built-up material
Elastic strength [$R_{p0.2}$]	MPa	210	210
Failure strength [R_m]	MPa	455-560	660-700
Ductility [A]	%	22-32	22
Impact test in bending [KV_2]	J.	100-130	240-300



Basic variant of the machine

STANDARD ACCESSORIES

Direct measuring of all movement axes

Tool magazine 30 positions

Fully integrated building-up head for modified MIG/MAG technology

High-pressure contour drying and cleaning of the section with air (three systems in total for the HM technology needs)

Additional drying of the headstock face

Working space imaging using a camera with a visiport and view visualisation using large touch screen in the machine cover

Cover with a double door allowing for either standard work with a visual view of the operator through the safety glass into the working space during machining operations or the building-up operation upon closing the second cover door

Possibility of recording the process parameters for analysis and checking of technological parameters in real time (e.g.: axis position, program speeds, additive technology parameters, component number, deposit number, etc.) with the objective of technology repeatability or performed technology validation

SPECIAL ACCESSORIES

External cooling of the cutting and depositing point with an adjustable flow rate value 50–120 l/min

High-pressure central cooling of the tool with an adjustable pressure value 40–120 bar

Cutting emulsion temperature stabilisation

Large-volume area drying and cleaning of the section with air with its own blower

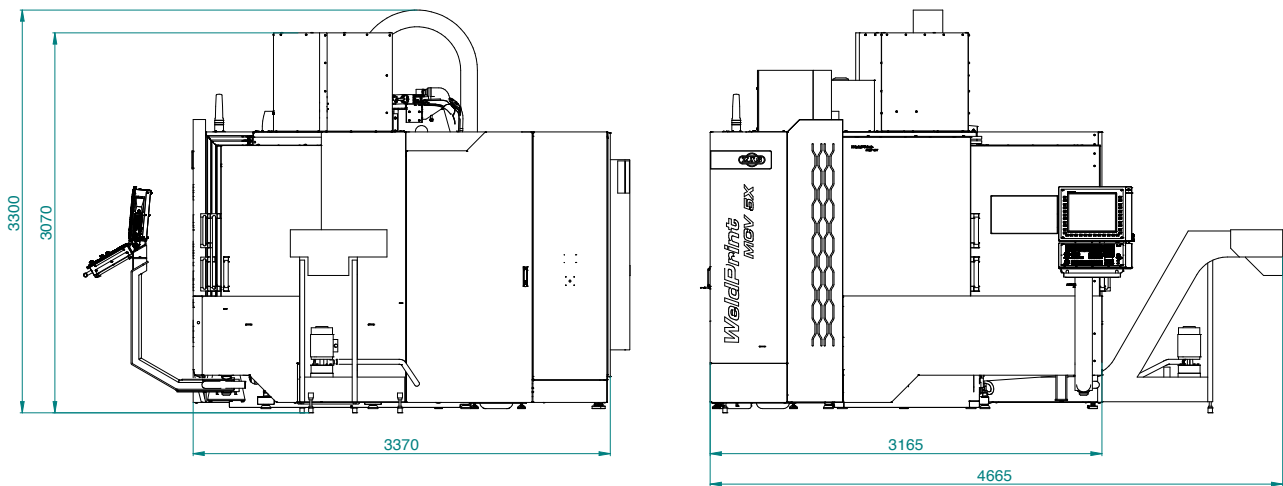
Special extraction of the working space allowing for extracting and filtering both the wet atmosphere created during high-pressure central cooling of the cut and the dry atmosphere of the fumes created during metal depositing

Working space imaging using a thermal camera for temperature checking and analysis

Tool and workpiece probe for process metering

Enclosed system of fluid cooling of the clamping table

Machine dimensions



Technical specifications

X-axis travel	mm	1 100
Y-axis travel	mm	590
Z-axis travel	mm	415
W-axis travel	mm	230
Tilting A-axis	°	± 110
Rotary C-axis	°	360
Table clamping area	mm	Ø 520
T-slots (number × width × spacing)	mm	4 × 14 × 45°
Max. weight on table	kg	400
Travel range in X, Y, Z axis	mm.min ⁻¹	1 - 40 000
X-, Y-, and Z-axis rapid feed	mm.min ⁻¹	40 000
Maximum table speed	min ⁻¹	20
Setting accuracy of coordinates X, Y, Z	mm	0,01
Division accuracy	°	0,001
Continuously variable spindle speed range	min ⁻¹	1 - 18 000
Spindle taper		HSK-A63
Spindle drive output (40%ED)	kW	25 / 35
Maximum torque S1/ S6	Nm	86 / 120
Max. number of tools in the magazine		30
Max. tool diameter in the magazine	mm	125
Max. tool length in the magazine	mm	350
Max. tool weight with automatic exchange	kg	6,5
Required building space of the machine - l × w	mm	4 700 × 4 500
Machine height	mm	3 300
Machine weight	kg	5 500
Max. total machine input	kVA	50
Air operating pressure	MPa	0,6

The machine conforms to **CE**

Due to the constant development and innovation of the machines, the data in this promotion material is not binding.

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