MARKING TECHNOLOGY

Continuous casting

en

Permanent and contrast marking for hot products
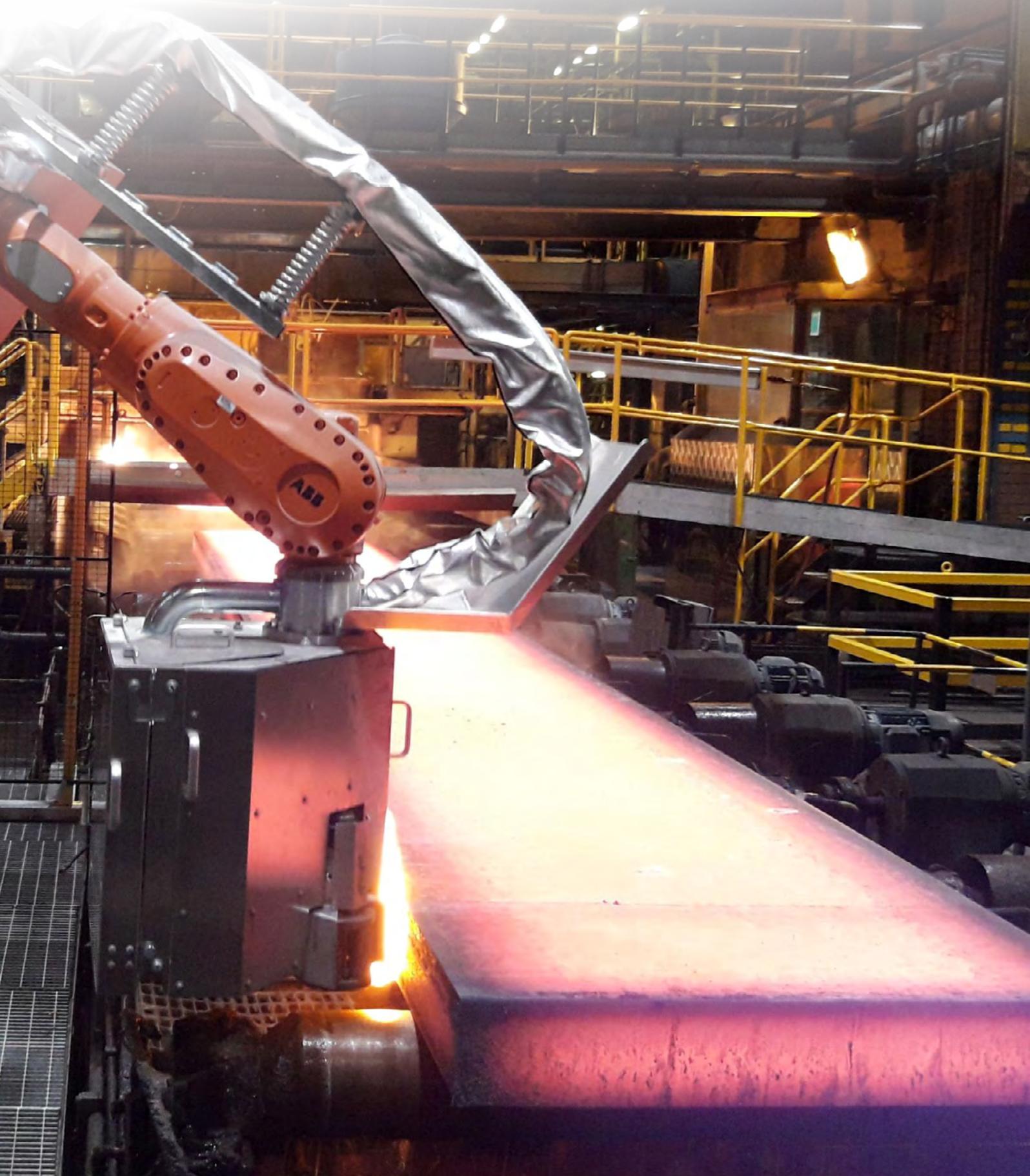
MARKING TECHNOLOGY

Continuous Casting

Alpine Metal Tech offers a range of high-quality permanent and contrast marking technologies for the continuous casting area.

Alpine Metal Tech machines are designed to operate in harsh industrial environments, providing consistent and reliable performance even in extreme conditions. Single or technology combined marking machines ensure reliable, accurate, permanent and high-resolution identification of steel products with optional add-on features such as ID reading systems. The marking machines are available in different versions - floor, bridge, or robot type - and are customizable to meet individual customer needs, making them suitable for a wide range of applications. Alpine Metal Tech is a strong and experienced partner for our customers throughout the product and plant lifecycle. Our expertise in consulting and engineering, commissioning and service is the key to sustainable project success.

TECHNOLOGIES

» Metal Powder Marking (MP)

» Hot Spray Marking (HS)

» Single Nozzle Paint Marking (SN)

» Dot Paint Marking (DP)

» Revolving Head (RH)

» Heavy Punch Marking (HP)

» Label Marking (LB)

» Laser Marking (LM)

» Smart Identification

METAL POWDER

MP Marking

The Metal Powder Marking was developed to apply clearly visible and long lasting characters, readable from far distance.

By using aluminium oxide powder, product temperature up to 1100°C can be marked without fading. Marking is performed by blowing metal powder through a gas flame for melting it to the surface of the product.

YOUR ADVANTAGES

» High application temperature
Up to 1100 °C without fading

» High visibility
Large and clear characters offer a high visibility even for crane operators.

» Long durability
Long-lasting marking and therefore high traceability

» Easy maintenance
Automated cleaning sequences reduce maintenance requirements
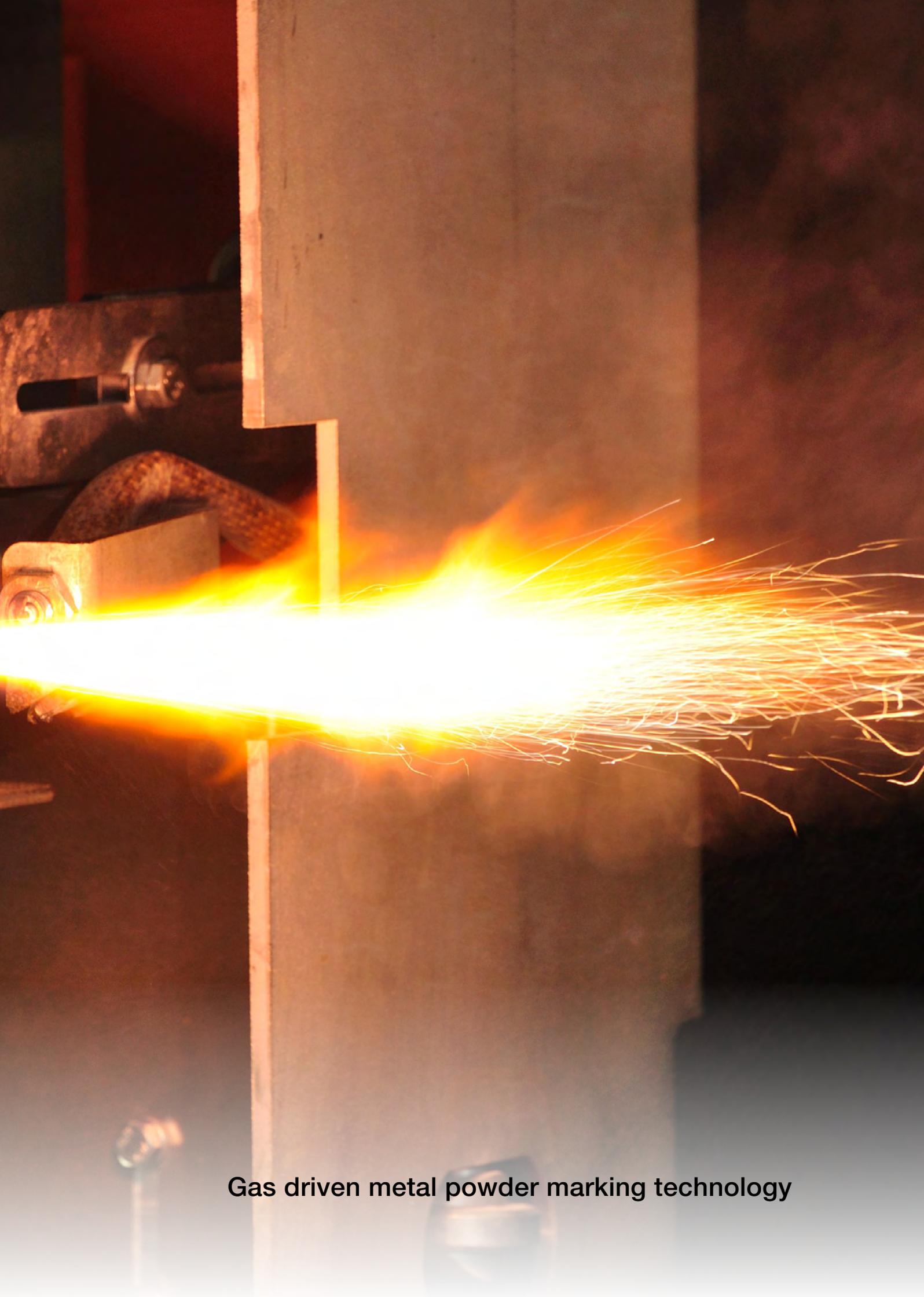
Gas driven metal powder marking technology

FUNCTION

The marking unit case as housing and heat protection for the marking system is mounted either on a multi-axis machine or on a robot. In addition to the marking system, the marking housing contains a descaling unit to remove loose scale from the marking surface. The descaling unit is also used to detect the product. The marking head is ignited via an external ignition and the powder is transported from the powder container to the marking head. The writing movement is then carried out and the marking powder is melting to the material to generating clearly visible characters.

(1) Marking head (torch)	(4) Descaler unit
(2) UV flame detection sensor	(5) Attachment flange
(3) Powder container	(6) Cover, heat protection

TECHNICAL DATA

Machine types	floor	
	bridge	
	robot	
Machine data	temperature range	400°C to 1100°C
	marking types	alphanumeric and special characters
	character size	40 – 150 mm
	marking lines	number of characters and lines on request
Media data	compressed air	filtered and drained
	pressure	min. 4 bar
	consumption	0.2 Nm³/min during marking process
	Oxygen	min. 99.5% purity
	pressure/consumption	min. 3 bar/approx. 2 Nm³/min
	consumption per cycle	approx. 50 Ndm³
	natural gas/LPG	dry and clean without settling elements
	pressure/consumption	min. 1.5 bar/approx. 0.8 Nm³/h
	consumption per cycle	approx. 20 Ndm³
Consumables	marking powder	aluminium oxide
Options		laser based edge detection
		AMTident ID reading system
		AMTinspect product measurement system

Marking examples

HOT SPRAY

HS Marking

The Hot Spray marking machine is one of the earliest developments of Alpine Metal Tech and the most popular technology to mark hot products.

The cost-effectiveness and simplicity of the marking technology are the main reasons for the long-lasting success of this technology. Marking is performed by blowing liquid metal which is melt in an electric arc between two wires to the surface of the product.

YOUR ADVANTAGES

» ## Low production costs
Low consumable costs due to use of standard aluminium or bronze welding wires.

» ## High visibility
Large characters offer a high visibility even for crane operators.

» ## Long durability
Long-lasting marking and therefore high traceability

» ## Easy maintenance
Easy to maintain and therefore a perfect technology for harsh environments where a durable and reliable marking is required.

Electric arc spray marking technology

FUNCTION

The marking unit case as housing and heat protection for the marking system is mounted either on a multi-axis machine or on a robot. In addition to the marking system, the marking housing contains a descaling unit to remove loose scale from the marking surface. The descaling unit is also used to detect the product. The principle of this marking process is originated on thermal metal coating. Two wires are fed through a spray gun and are continuously melted by means of electric current forming an arc. The two wires are fed from two spools placed in the marking unit. The spray wires are transported via the feed rollers through the wire nozzles to the point of short circuit in the nozzle system. The writing movement is then carried out and the marking wire is melting to the material to generating clearly visible characters.
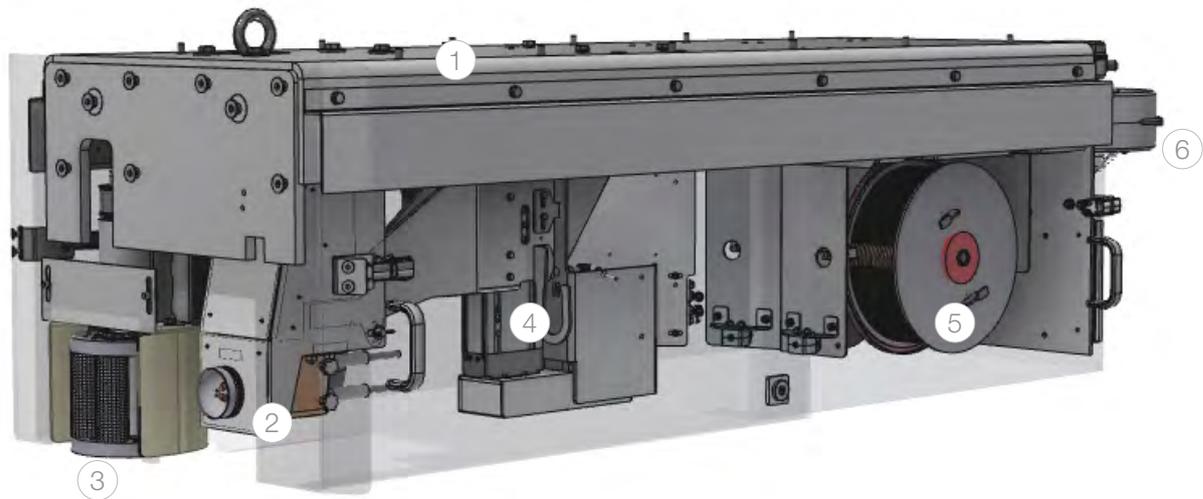
1. Marking unit case
2. HS marking head
3. Descaler unit
4. Cross slide
5. Wire box
6. Cooling fan

TECHNICAL DATA

Machine types	floor	
	bridge	
	robot	
Machine data	temperature range	aluminium wire: -5°C to 700°C
		bronze wire: -5°C to 900°C
	marking type	alphanumeric, special characters
	character size	60-150 mm
	marking lines	number of characters and lines on request
Media data	compressed air	filtered and drained
	pressure	min. 4 bar
	consumption	0.2 Nm³/min during marking process
Consumables	marking wire	aluminium wire, bronze wire
Options		laser based edge detection
		AMTident ID reading system
		AMTinspect product measurement system

Marking examples

SINGLE NOZZLE
SN Paint Marking

The Single Nozzle Paint Marking Machine is designed for marking of slabs, blooms and billets at continuous casting platforms. The system is based on paint marking with single-nozzle marking heads. The complete equipment is manufactured using standardised modules, which results in high reliability and low maintenance of equipment and specially selected electrical and mechanical parts that are designed, well tested and proven to function in heavy industries.

DOT PAINT
DP Paint Marking

The Dot Paint Marking Machine is designed for the marking of slabs, blooms and billets at continuous casting platforms. The system is based on paint marking with 7 or 9 nozzle marking sections. The marking equipment can be combined with all Alpine Metal Tech base machines and is available as stand- alone machine or in combination with HP Punch Marker. The complete equipment is manufactured using standardised modules, which results in high reliability and low equipment maintenance.

» ## High visibility
Large characters offer a high visibility even for the crane operator.

» ## Easy maintenance
Automated cleaning sequences reduce maintenance requirement

» ## DP – Short marking cycles
Extremely short marking cycles, as dot matrix is applied during linear movement.

» ## SN – Continuous line marking
Continuous line characters advantageous on rough surfaces

paint based marking technology

SN – FUNCTION

The marking unit case as housing and heat protection for the marking system is mounted either on a multi-axis machine or on a robot. In addition to the marking system, the marking housing contains a descaling unit to remove loose scale from the marking surface. The descaling unit is also used to detect the product. The paint will be transported through hoses from the paint cabinet to the paint nozzle. The writing movement is then carried out and the paint is sprayed through a nozzle on the material to generating clearly visible characters.
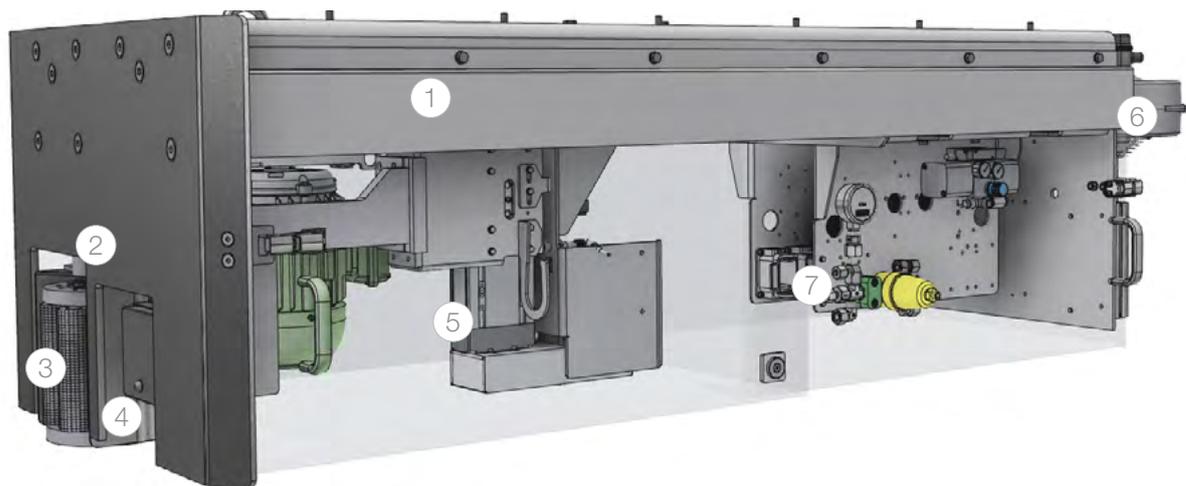
1. Marking unit case with sliding covers
2. Front plate
3. Descaler unit
4. Single Nozzle marking head
5. Cross slide arrangement for marking head movements
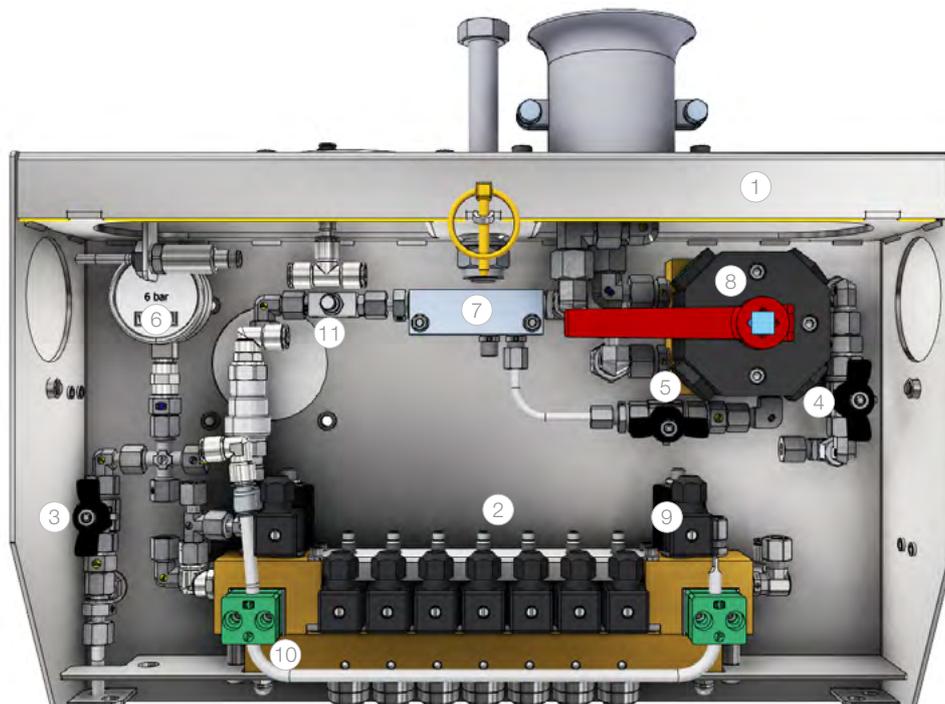6. Fan
7. Pneumatic panel

SN – TECHNICAL DATA

Machine types		floor
		bridge
		robot
Machine data	temperature range	product temperature: -5°C - 1000°C
		ambiente temperature: -10°C - 40°C
	marking types	alphanumeric and special characters
Marking data	character size	40 - 150 mm
	marking head	1 nozzle
	number of lines	number of characters and lines on request
	marking speed	1 sec / character with 100 mm height
Media data	compressed air	filtered and drained
	pressure	min. 5 bar
	consumption	max. 0.1 Nm³/min during marking process
Consumables		water based for hot products (<1000°C)
		solvent based for cold products (-5°C - ~600°C)

Marking examples

DP – FUNCTION

The marking unit case as housing and heat protection for the marking system is mounted either on a multi-axis machine or on a robot. In addition to the marking system, the marking housing contains a descaling unit to remove loose scale from the marking surface. The descaling unit is also used to detect the product. The paint will be transported through hoses from the paint cabinet to the 7 or 9 nozzle paint marking head. The equipment is specialized for product markings with a request for low cycle times. The marking can be applied up to 1,5m/s during movement and provide a marking content of standard, special characters, logos and 2D codes.

1. Marking unit case with removable cover
2. DP marking section
3. Ball valve - Drain
4. Ball valve - Paint return line
5. Ball valve - Cleaning water to by-pass
6. Pressure gauge for paint return pressure
7. Manifold for water supply to the cleaning valves on the marking section
8. Manually bypass valve
9. Cleaning valves
10. Cooling tube for cooling air
11. Throttle valve for dosage of water to atomizing air

DP – TECHNICAL DATA

| Machine types		floor
		bridge
		robot
Machine data	temperature range	product temperature: -5°C - 1000°C
		ambiente temperature: -10°C - 50°C
	marking types	alphanumeric, and special characters, logos within 7x5 or 9x7
		dot matrix, datamatrix codes (2D)
Marking data	character size	50 - 200 mm
	dot size	8 - 10 mm
	marking head	7 or 9 nozzles
	number of lines	numbers of characters, lines and special sizes on request
	marking speed	up to 1.5 m/s
Media data	compressed air	filtered and drained
	pressure	min. 6 bar
	consumption	max. 1.2 Nm³/min during marking process
Consumables	paint	water based for hot products (< 1000°C)
		solvent based for cold products (-5°C - ~600°C)

Marking examples

REVOLVING HEAD

RH Stamping

One of Alpine Metal Tech's flagship products is the Revolving Head Stamping Machine, designed for permanent marking of slabs, blooms, and billets in harsh steel plant environments.

The equipment is manufactured using standardized modules that result in high reliability, low maintenance, and low running costs. Stamping energy is generated by using pneumatic impact cylinders. The Machine is capable of stamping unmistakable and full characters that can vary in size and number of lines, depending on individual customer requirements. An optional clamping unit fixes the product and keeps it in position during stamping. The Revolving Head Stamping Machine is a reliable, low-maintenance, and cost-effective solution for steel plants looking for permanent and undestroyable marking on their products.

YOUR ADVANTAGES

» Stamped marks
long durability, permanent and undestroyable marking

» Unmistakable and full characters

» Low running costs
OPEX friendly, no consumables, low maintenance requirements

» High visibility
High legibility with human eye due to unmistakable character design
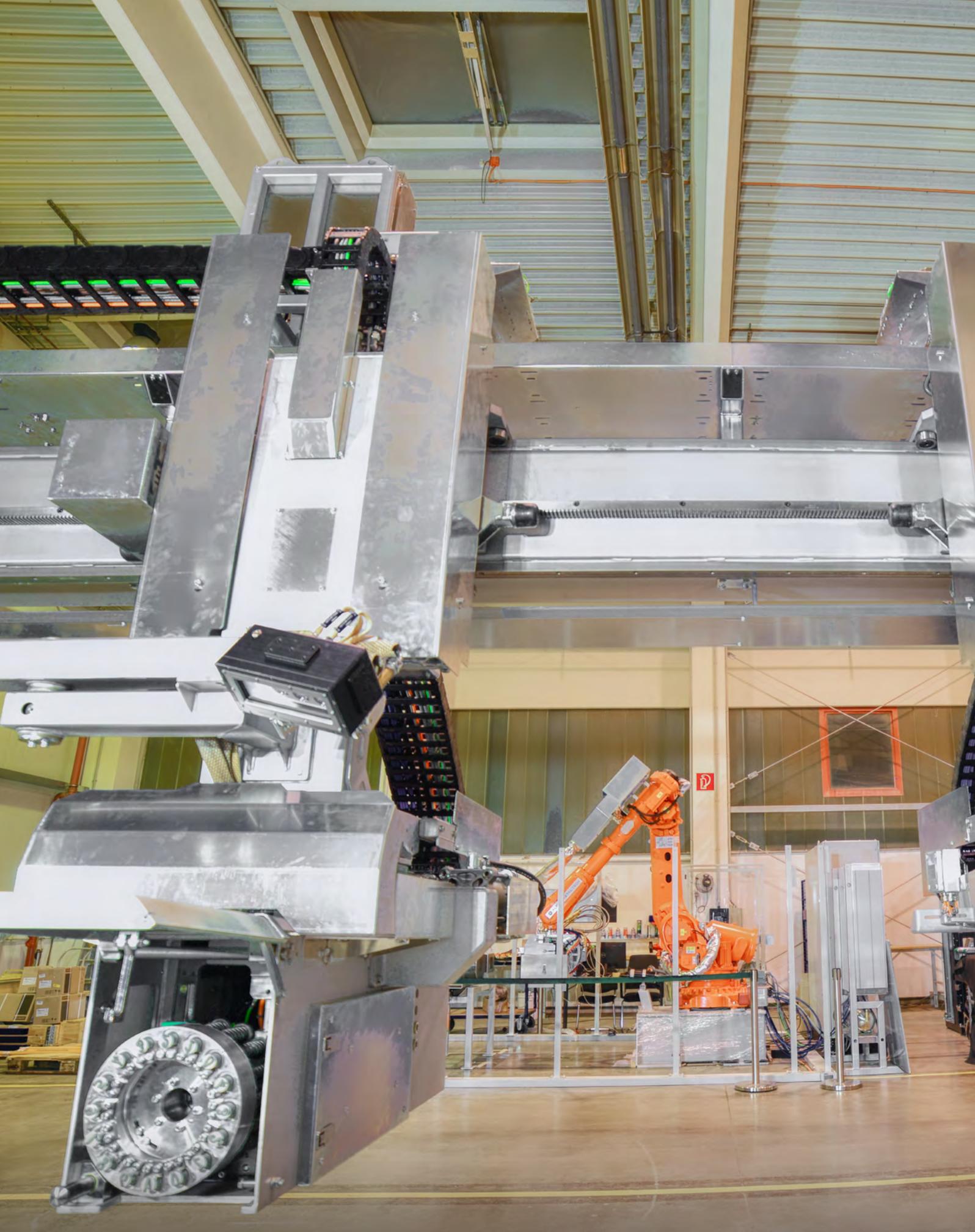
Pneumatic impact stamping technology

FUNCTION

The marking unit case is used as housing and heat protection for motors, cylinders and other subassemblies. Maintenance flaps are provided on both sides of the marking unit case for better accessibility during maintenance or repair. The contact flap, mounted at the case front side, acts as product detection unit as the machine moves forward towards the product. The stamps are carried by the revolving head disc. As the revolving head rotates, it positions the stamp for stamping. Once in position the pneumatic punch cylinder is activated which pushes the stamp towards the product penetrating the surface and generating a permanent unmistakable mark.
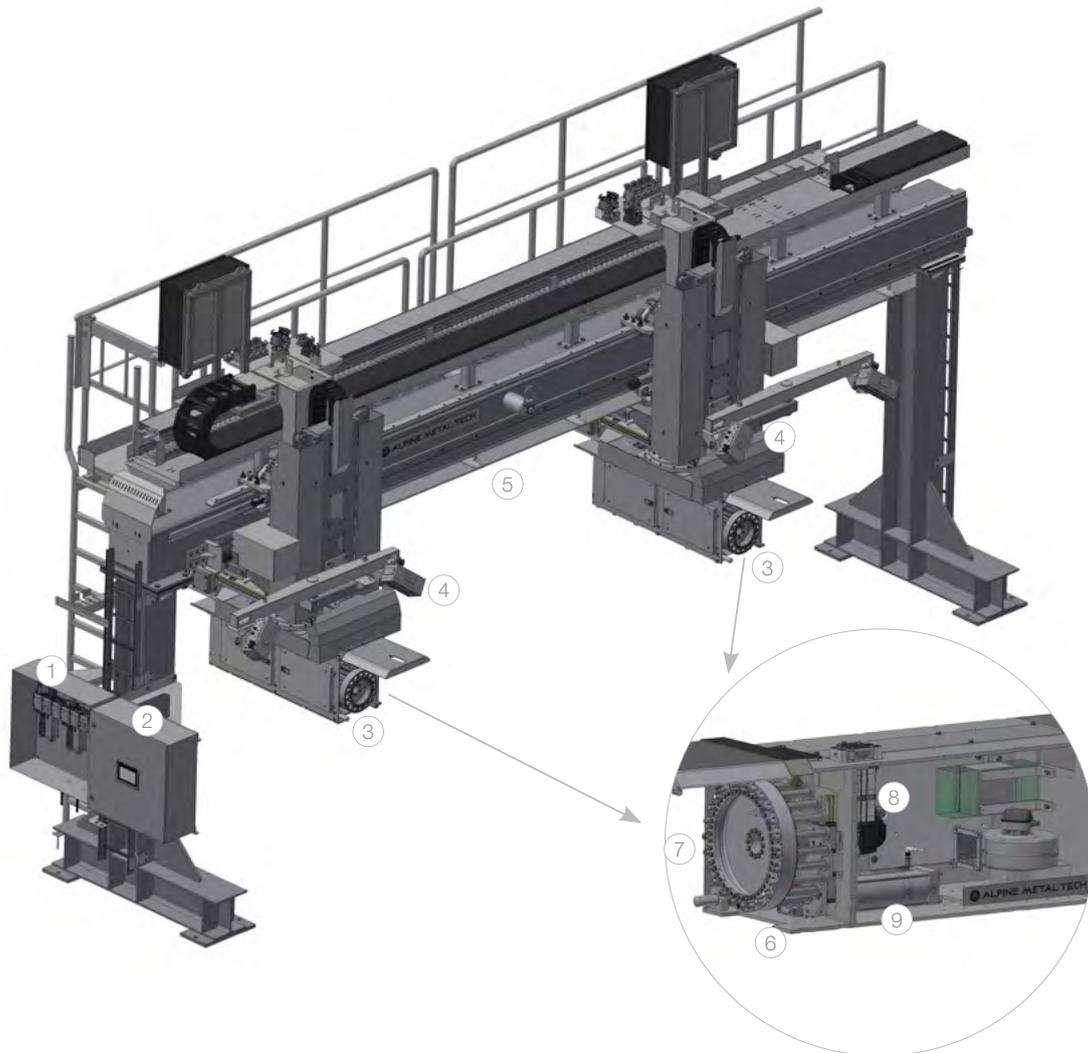

① Pneumatic maintenance panel		⑥ Claw	
② Local operation panel		⑦ Revolving Head Disc with stamps	
③ Marking unit		⑧ Line shift cylinders	
④ AMTident VIS (ID Reading)		⑨ Stamping cylinder	
⑤ Main girder			

TECHNICAL DATA

Machine types		
	floor	
	bridge	
	robot	
Machine data	temperature range	600°C to 1.100°C
	marking types	capital letters, numbers, special characters on demand
	character size	10/5, 12/6, 15/8, 20/10 mm
	marking lines	1-4 lines possible
	line space	5 mm
	revolving head type	RH16, RH24
	stamping cycle time	8s (cycle time to stamp 10 characters in one line)
Media data	compressed air	filtered and drained
	pressure	min. 5 bar
	consumption	0.3 Nm³/min
Consumables		-
Options		clamping unit
		laser based edge detection
		AMTident ID reading system
		AMTinspect product measurement system

Marking examples
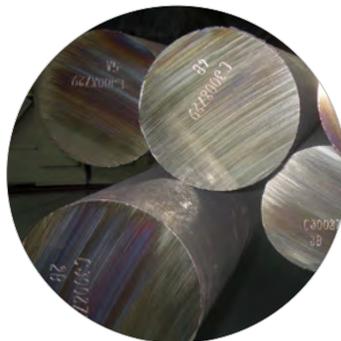
HEAVY PUNCH

HP Marking

The needle punch marking machines are developed for to apply permanent markings to slabs and blooms at product temperatures up to 1100°C.

The adjustable punch force allows to mark at consistent penetration depth on various steel grades. The heavy punch marking section consists of 8 hard metal needles. The marking image is applied in one linear stroke generating matrix font characters with adjustable heights. Typically ID numbers, plain text markings of different character sizes and also 2D datamatrix codes are applied.

As the exhaust air of the marking head is used for internal cooling of the marking head, an additional cooling is not required.

YOUR ADVANTAGES

» Low running costs
   Punch pins can be resharpened

» Long durability
   Permanent marking even for hard steel grades

» Easy maintenance
   Easy punch pin exchange during short stops

METAL TECH

FUNCTION

The marking unit case as housing and heat protection for the marking system is mounted either on a multi-axis machine or on a robot. In addition to the marking system, the marking housing contains touching rolls and a pressure accumulator. The marking unit with the touching rolls is pressed against the product and the marking movement is started. During marking, electrical signals are sent to the punchers of the marking head, the high timing accuracy and the high penetration force ensures consistent high quality marking.
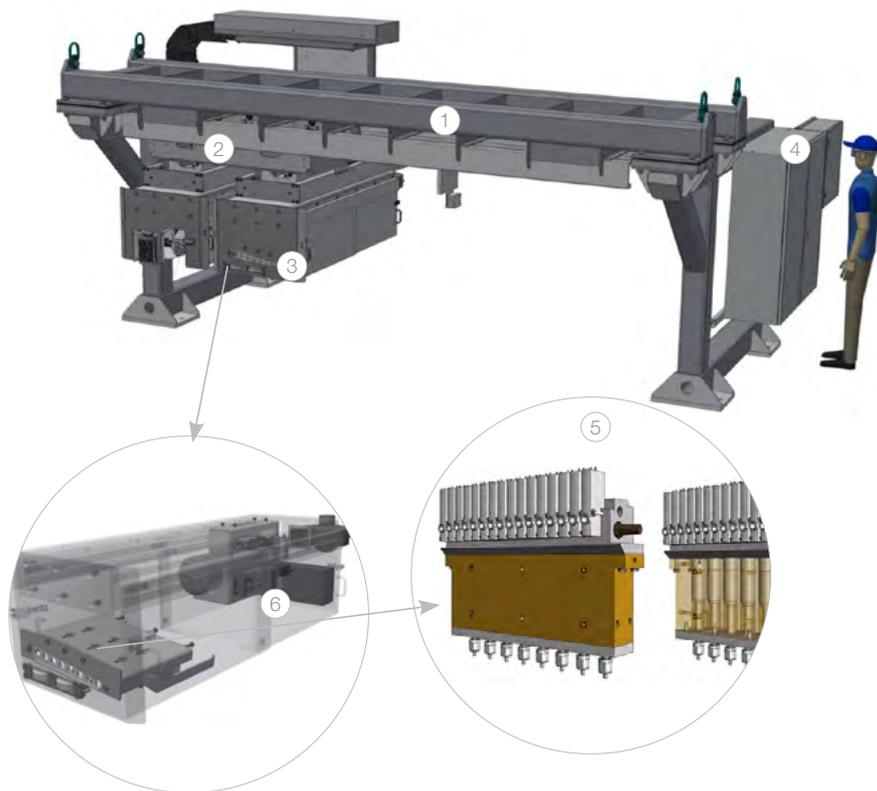
1. Steel structure with guide rails
2. Trolley for the cross and longitudinal movement
3. Marking unit
4. Local operation panel / Media cabinet
5. HP marking head
6. Valve unit with pressure accumulator

TECHNICAL DATA

|		
Machine type	floor	
	bridge	
	robot	
Machine data	temperature range	-30°C to 1100°C
	marking type	alphanumeric, special characters, datamatrix code
	character size	40-100 mm
	marking lines	number of characters and lines on request
Media data	compressed air	filtered and drained
	pressure	min. 4 bar
	consumption	15 Nm³/min during marking process
Consumables		-
Options		laser based edge detection
		AMTident ID reading system
		AMTinspect product measurement system

Marking examples

LABELING
LB Marking

The Label Marking Machine is Alpine Metal Tech's solution for applying high information content markings accurately to different product surfaces.

With temperature resistance up to 900°C, our Label technology ensures markings that are readable by automatic identification systems, such as Barcodes, Data-Matrix & QR 2D codes. Additionally, the Label machine provides a safe and efficient way of applying labels without having human action close to dangerous production areas. Also markings in the form of plain text in different character sizes and styles or customized combination can be realized.

YOUR ADVANTAGES

» ## Short marking cycles
Label picked up by the applicator before the product arrives

» ## High flexibility
Flexibility to place the labels in different positions and angles

» ## High resolution marking
Thermo-transfer printed high definition label

» ## Machine readable codes
High resolution codes readable by standard equipment
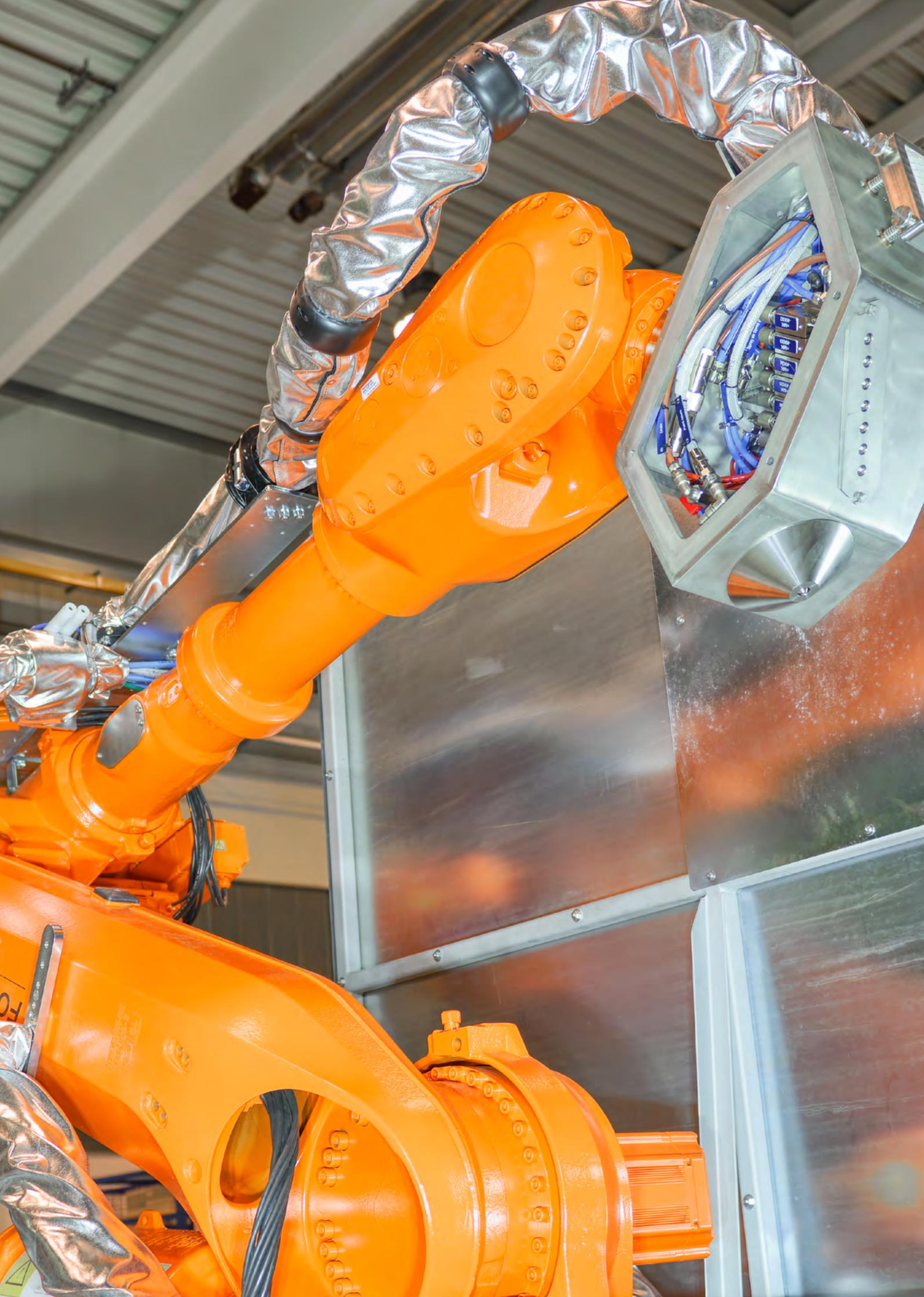
FUNCTION

The Label Marking Machine is a device that combines a label printer unit with an applicator to apply labels to various product surfaces, even in harsh industrial environments. The applicator machine picks up and transports the label to the product surface with high position accuracy. The machine offers a wide range of labels suitable for different needs and is capable of labeling even hot surfaces up to 900°C.
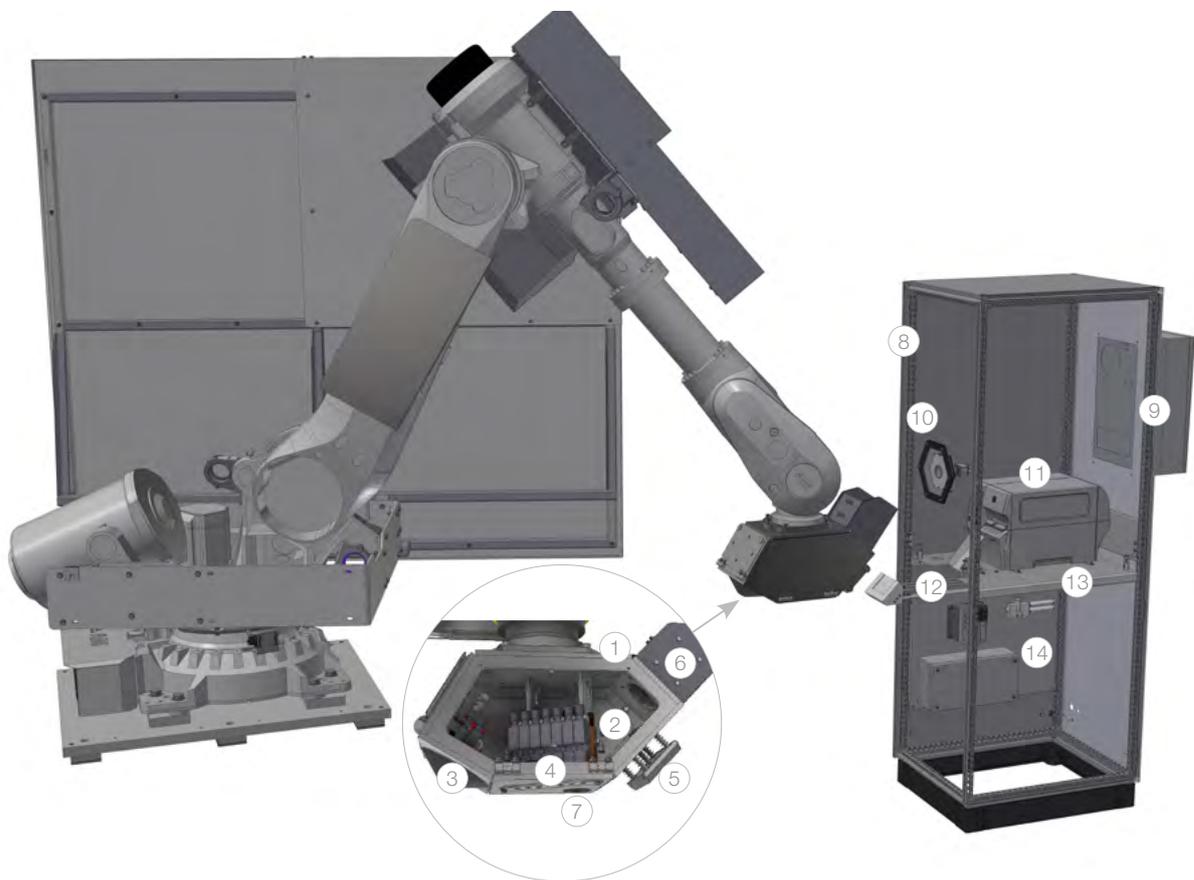
① Steel case	⑧ Printer cabinet
② Removable cover	⑨ Cooling unit
③ Marking nozzle - Single nozzle	⑩ Camera unit
④ Spray nozzle - Dot Paint	⑪ Label printer
⑤ Labeller	⑫ Vacuum generator
⑥ Heat protection cover	⑬ Compact cylinder with guide unit
⑦ Detection cylinder	⑭ Pneumatic panel

TECHNICAL DATA

Machine types		floor
		bridge
		robot
Machine data	temperature range	product temperature: 20 - 900° C
		ambient temperature: -10 - 50° C
	marking types	printed labels with alphanumeric, and special characters, logos,
		machine readable codes (datamatrix and QR codes)
Marking data	character size	adjustable via different label printer layout templates
	marking head	vacuum label applicator
	number of lines	adjustable via different label printer layout templates
	marking speed	label is printed before the product arrives
Media data	compressed air	filtered and drained
	pressure	min. 4.5 bar
	consumption	max. 0.1 Nm³/min
Consumables		lables

Marking examples

LASER

LM Marking

Laser marking is an extremely versatile technology that can be used for marking of slabs, blooms, billets.

The technology is suitable for contrast based marking as well as engraving on hot and cold products. In many cases, marking on a previously applied paint layer provides the best results in terms of contrast and marking speed. Laser marking is unmatched in terms of marking resolution and flexibility. Apart from standard characters, which can be marked in many different fonts, it is possible to mark 1D and 2D codes as well as complex shapes and logos.
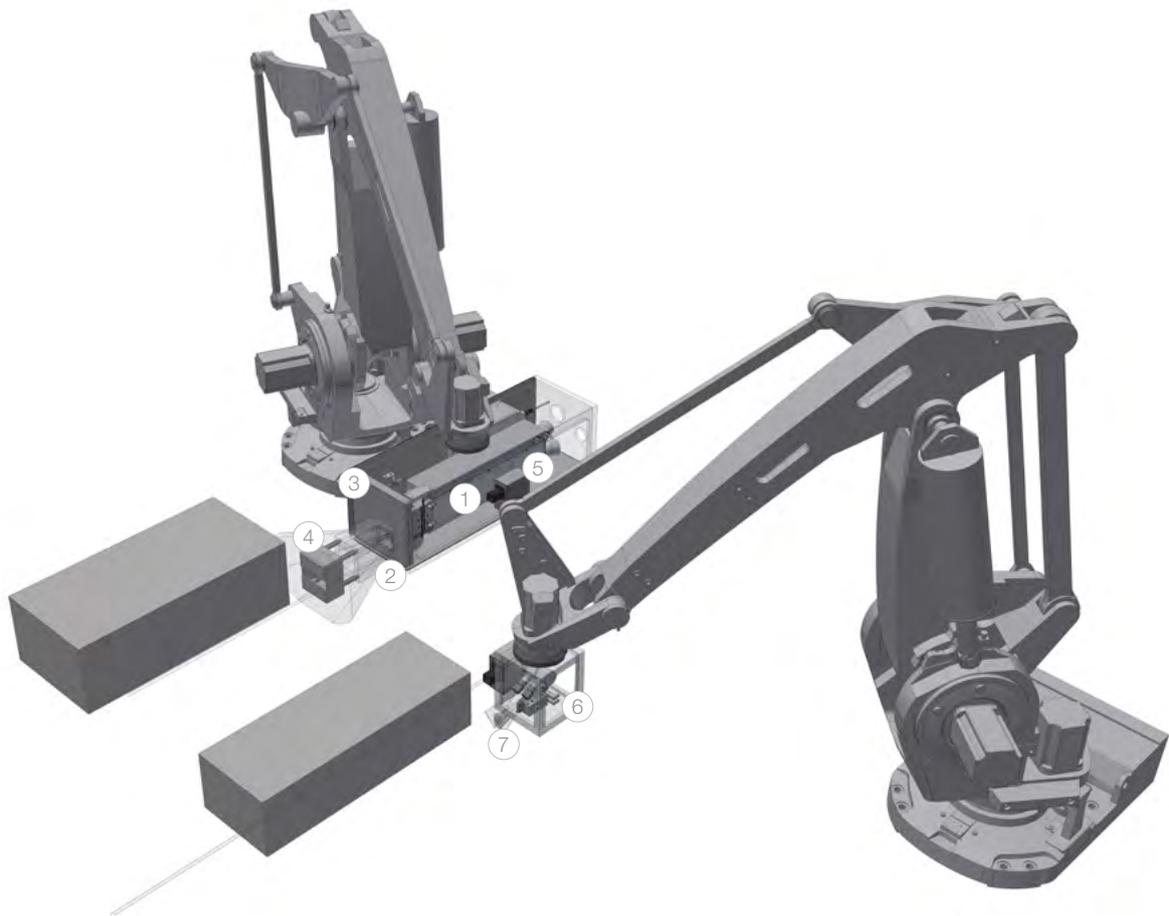
YOUR ADVANTAGES

» Low production costs
Laser only uses energy and has low maintenance costs

» High flexibility
Possibility to mark different fonts, logos as well as 1D and 2D codes

» Extendable
Automatic OCR reading system available

FUNCTION

Depending on the area of application, the machine can be designed as a robot version as well as a floor/bridge version. The best suited laser technology (CO_2 or solid state) and optics are individually chosen according to customer requirements and suitable protection measures are taken to protect the equipment from dust and heat. Our machines contain all additional equipment for surface preparation, such as descaling or paint layer application. Laser safety is taken very seriously and safety concepts are developed for each individual use case.


1. Laser source
2. Marking head
3. Heat protection
4. Contact flap
5. Distance laser
6. Paint layer nozzle
7. Water descaler

TECHNICAL DATA

Machine types		floor
		bridge
		robot
Machine data	temperature range	product temperature: 20°C - 900°C
	marking types	alphanumeric characters, logos, 1D codes 2D codes
Marking data	character size	2mm - 300mm (limited by chosen lens)
	number of lines	no restrictions
	typical time of marking	with paint layer: 2s for 50 characters (6mm size)
Media data	compressed air	filtered and drained
	pressure	min. 5 bar
	consumption	max. 0.1 Nm^3/min during marking process
Consumables		paint for paint layer

Marking examples
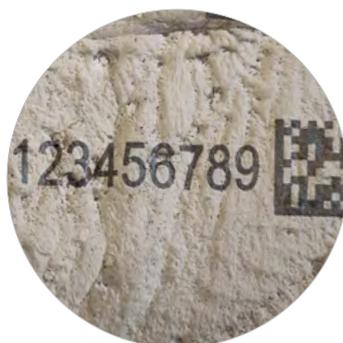
SMART IDENTIFICATION

Alpine Metal Tech provides advanced technology for unmistakeable product identification. The symbiosis of Alpine Metal Tech marking machinery and AMTident shows unique advantages for our customers as the entire key process for product tracing along the production process (marking, verification, identification) is offered out of one hand.
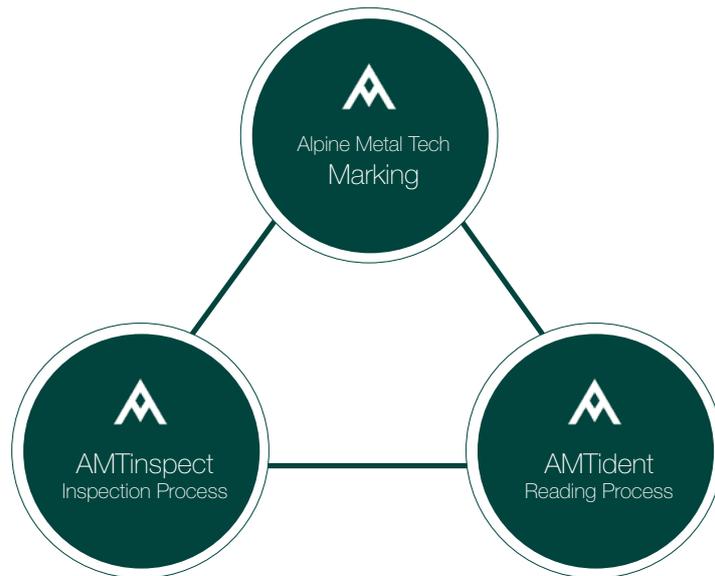
AMTinspect

AMTinspect forms the third part of Alpine Metal Tech's smart marking solutions triangle. The market demands for technology driven cycle time reduction and for a consistent product data basis for horizontal integration throughout the production line.

For coil marking machines AMTinspect is developed to provide touchless product position and dimension determination for cycle time reduction and marking flexibility increase. The robot marking head is extended with a laser scanner unit to acquire profile data which is processed by the AMTinspect application.

Scanning objectives are:

» Contactless product position and dimension determination to reduce marking cycle time (mechanical detection with touching cylinder as a backup system)
» Strap position detection to ensure that only the product surface is marked
» Disc profile investigation to find the best marking position on the disc in case of improper coil winding and to check for telescopes to increase machine security

AMTinspect provides result data to the marking machine Plc which adapts marking position and movements accordingly. Data, coil quality parameters and automatically generated coil evaluation reports are accessible to operators or to quality and line managers for deeper analysation, optimization purposes or logistics control.

Alpine Metal Tech took the next step towards smart marking for the overall objective to provide highest marking quality with high flexibility and at reduced cycle times.

AMTident

Option for all Alpine Metal Tech Marking Machines

AMTident is developed to meet the demand of reading product ID's independent from product, marking technology and environmental conditions. In order to provide highest identification rates, AMTident utilises a wide spectrum of industrial vision technology like CCD and infrared cameras, laser scanners and corresponding illumination equipment to ensure a stable lighting and acquisition scenery.

To achieve unequaled identification rates throughout a complex product range, diverse harsh environmental conditions and low contrast surfaces, AMTident can be delivered in three main versions, which are customized to appropriate site conditions.

AMTident VIS
Industrial cameras and high power flashes to handle challenging identification tasks

AMTident 3D

Laser based 3D depth data used for character recognition

AMTident IR
Infrared cameras used to read product IDs at hot products with low contrast markings

AMTident consists of two core elements, the sensor technology and the processing software. Alpine Metal Tech commits to full extend software concepts to provide data sovereignty for our customers from acquired data referenced to product information, through process visualisation to analysation dashboards. To close the data gap in highly automated production systems, AMTident follows a strict and modern database design to store raw and result data.

AMTident – product dashboard
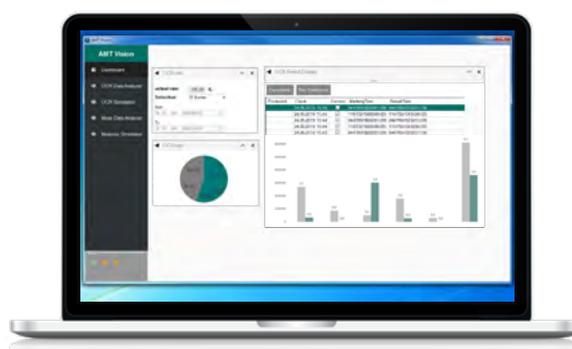
AMTident – analyser dashboard

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