GreenDock Robot - Technical file

2022

GreenDock Robot

1. THE AUTONOMOUS MOBILE ROBOT TOOL HOLDER

AMBPR
Autonomous robotics

GreenDock Robot

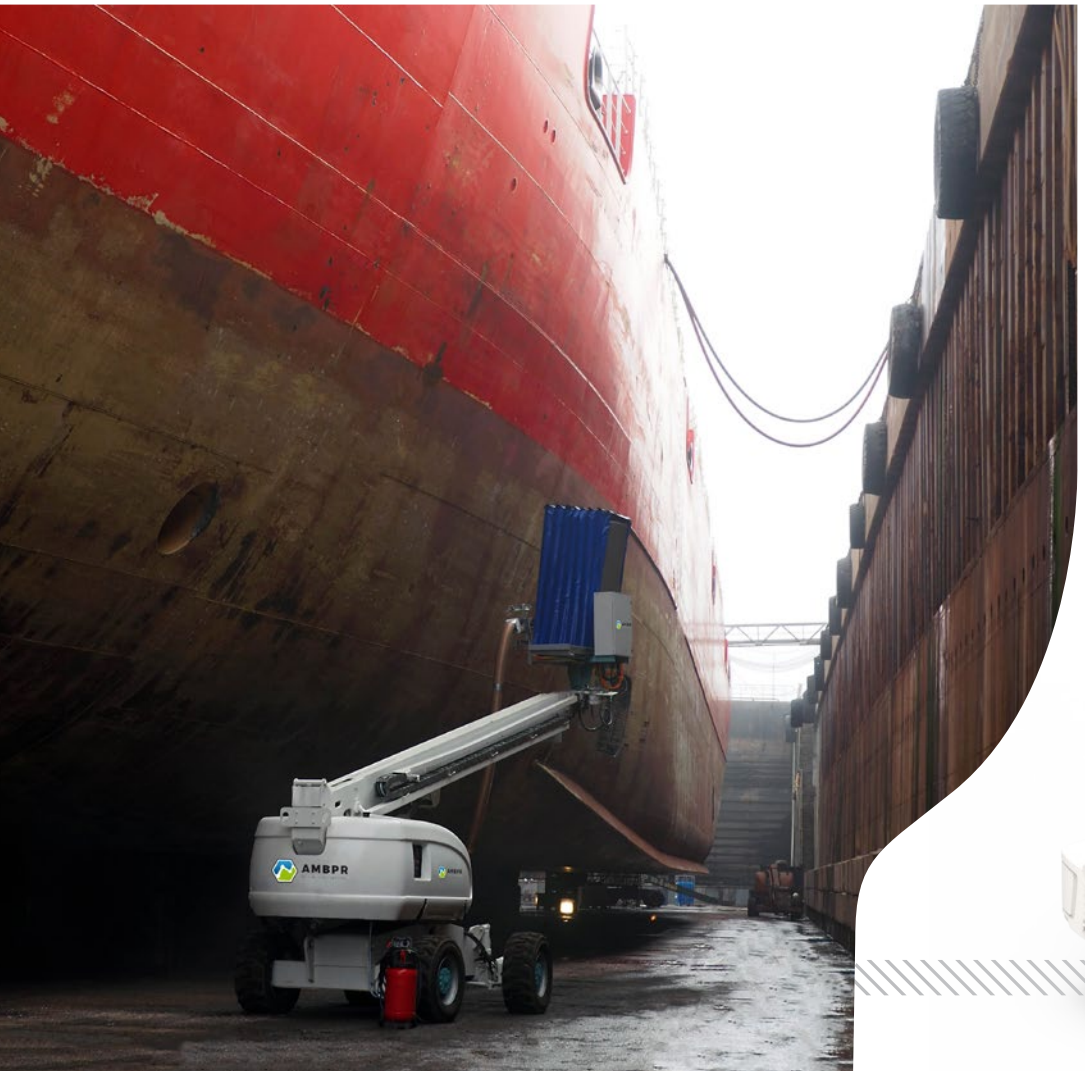
GreenDock Robot is a multifunction autonomous mobile robot.

It was designed as a tool carrier capable of carrying all the process equipment of a shipyard:

WASHING, SANDBLASTING AND PAINTING

<u>GreenDock Robot is made up of:</u>

- A head equipped with a Cartesian manipulator with its process tool support,
- A 28 m all-terrain diesel telescopic boom lift, Haulotte HT 28 RT JPRO,
- A command control system with its sensors and actuators to control the 10 axes of the robot and the 2 axes of movement of the 4-wheel drive base.



Head

It is suspended from the end of the pendulum arm and allows the placement of the various tools intended for surface treatment operations: Washing, Sandblasting and Painting

(ex: High pressure gun with flat jet nozzle, see page 18-19)

Telescopic arm

It ensures the positioning and maintenance of the head on the surface to be treated.

Turret

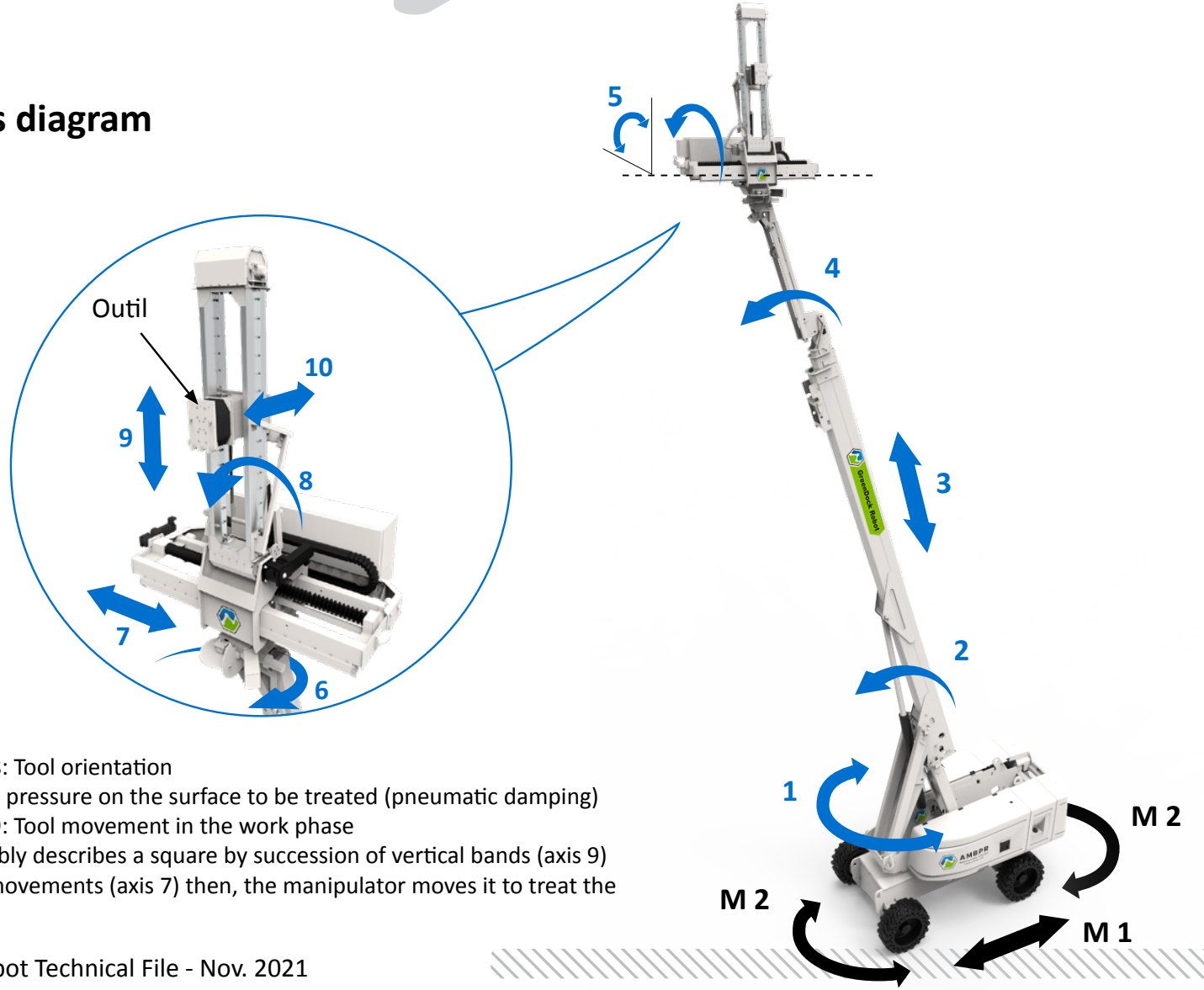
Liftable up to 70 ° and deployable to 28 m.

Mobile base

It ensures the stability of the system and moves autonomously under the supervision of an operator and his remote control.

1. The autonomous mobile robot tool holder

1-1 Axis diagram



AXES	FUNCTIONS
Axis 1	Turret rotation
Axis 2	Turret rotation
Axis 3	Telescoping of the boom
Axis 4	Elevation of the pendulum arm
Axis 5	Basket tilt
Axis 6	Basket rotation
Axis 7	Tool horizontal movement
Axis 8	Vertical tool movement
Axis 9	Vertical tool movement
Axis 10	Tool pressure
M 1	Movable base movement
M 2	Mobile base direction

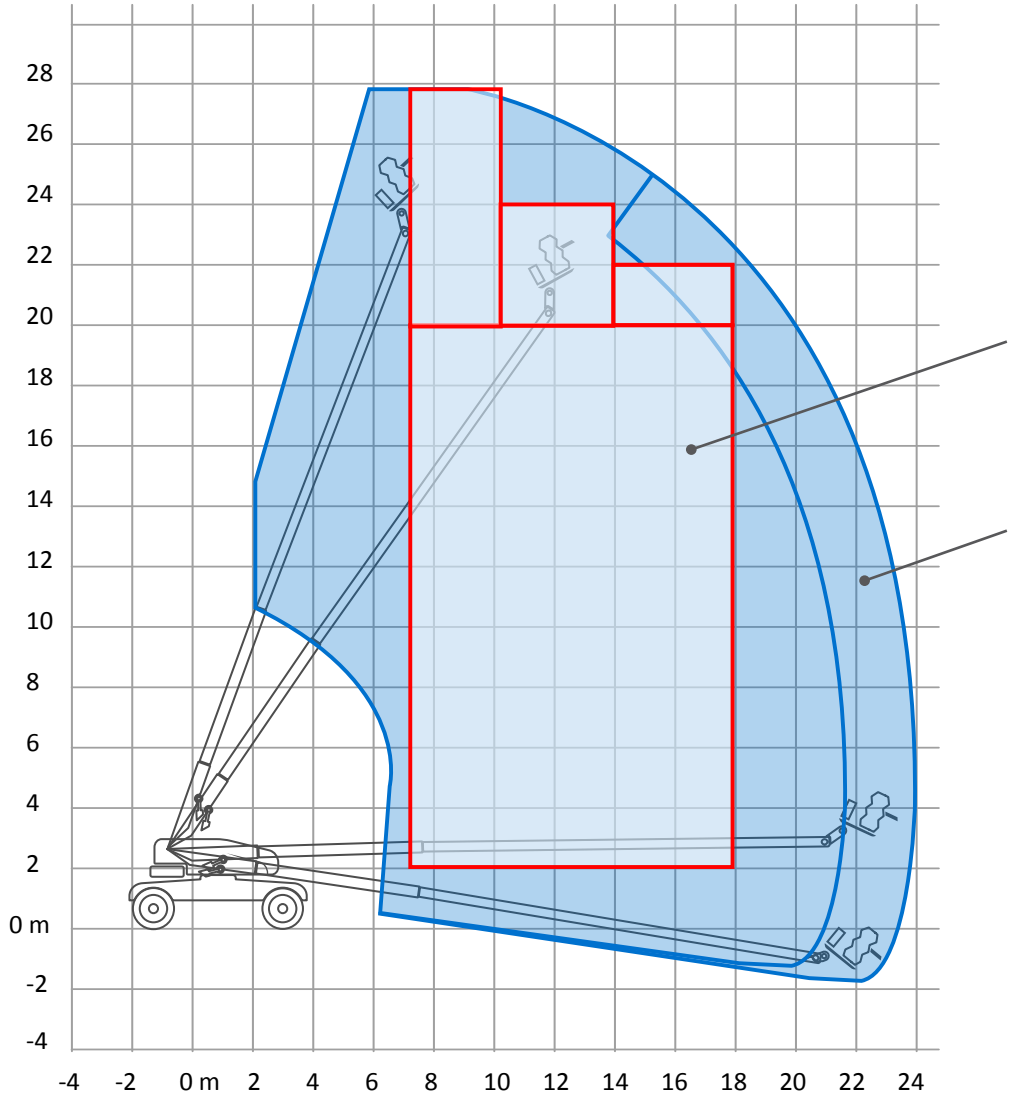
- Axes 6 and 8: Tool orientation
- Axis 10: Tool pressure on the surface to be treated (pneumatic damping)
- Axes 7 and 9: Tool movement in the work phase

The head assembly describes a square by succession of vertical bands (axis 9) and horizontal movements (axis 7) then, the manipulator moves it to treat the next zone.

1-2 Work envelope and payload

Working height	27.9 m
Negative work	up to 2 m

Maximum mass per process head	50 kg
Maximum thrust head pressure	120 kg
Max wind speed	60 km/h



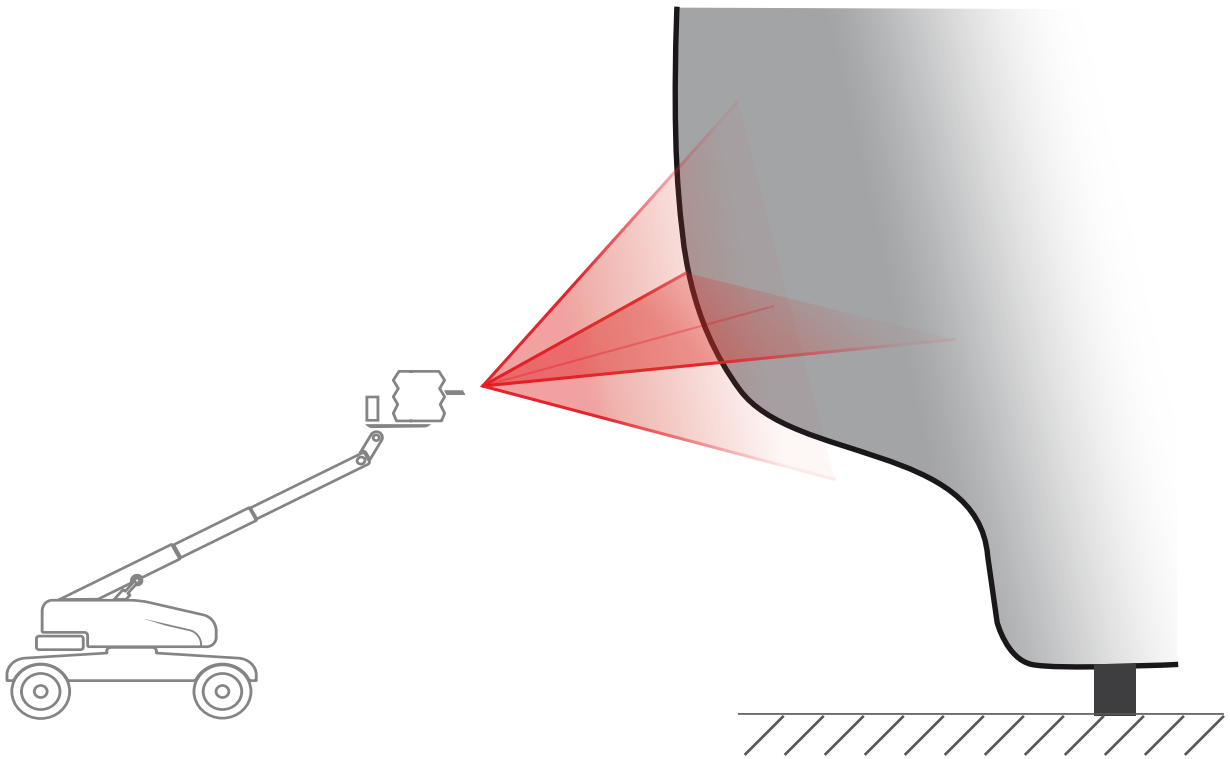
1-3 Mobile base

EXCELLENT ALL TERRAIN CAPABILITIES

- **4-wheel steering / 4-wheel drive**
- **Oscillating axle**
- **Crossing slopes up to 45%**

1-4 Detection and displacement process

The autonomy of the robot is acquired by a network of sensors which allows the gondola to locate itself in its environment. You can also cover an area of around 150 m² independently. The platform is moved by the mobile base and robotic axes.



2 laser sensors of the «Lidar» type

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Detection on 2 axes: vertical and horizontal

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Point cloud modeling

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Data acquisition

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Creation of a cartography

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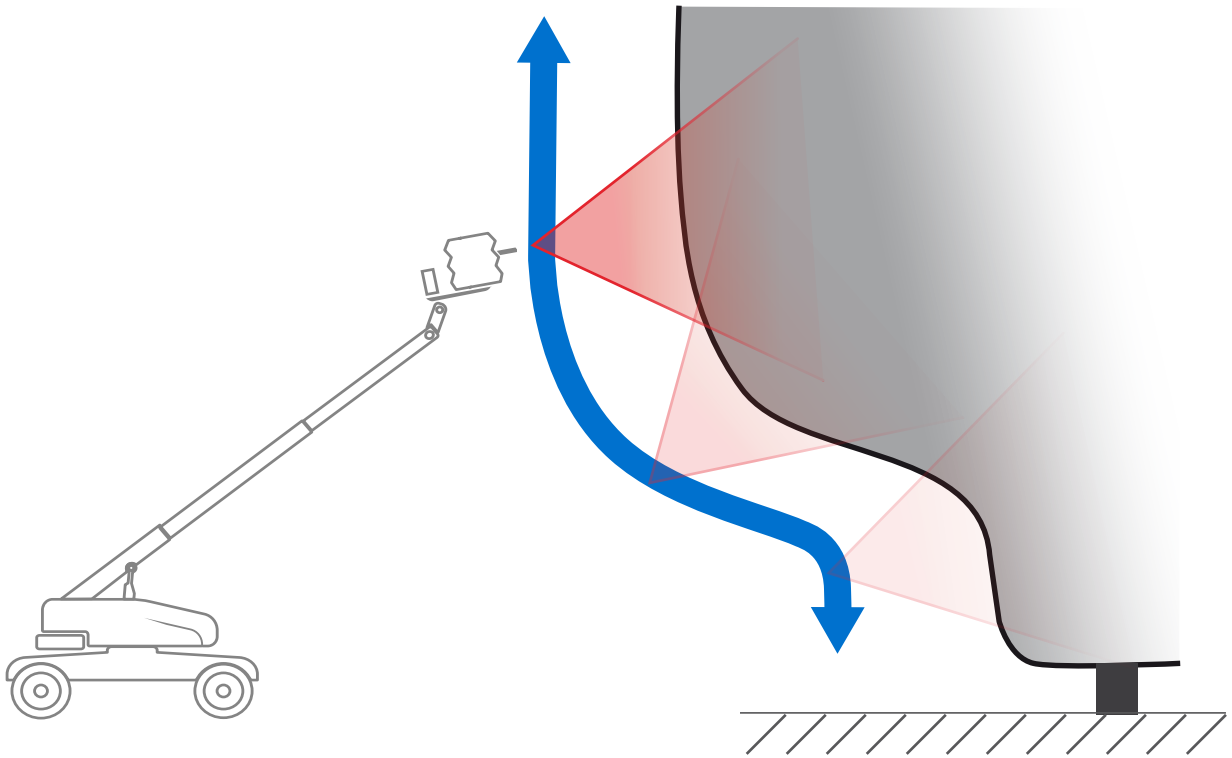
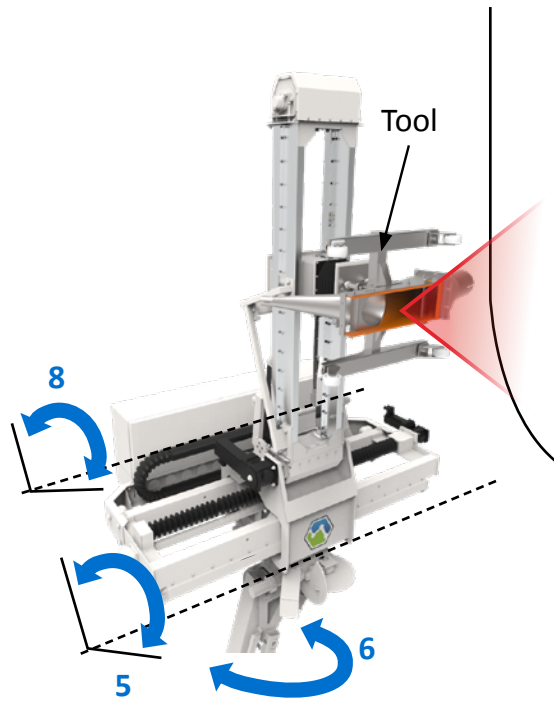
Calculation of the robot's trajectory by inverse kinematics

1-5 Monitoring of the hull profile

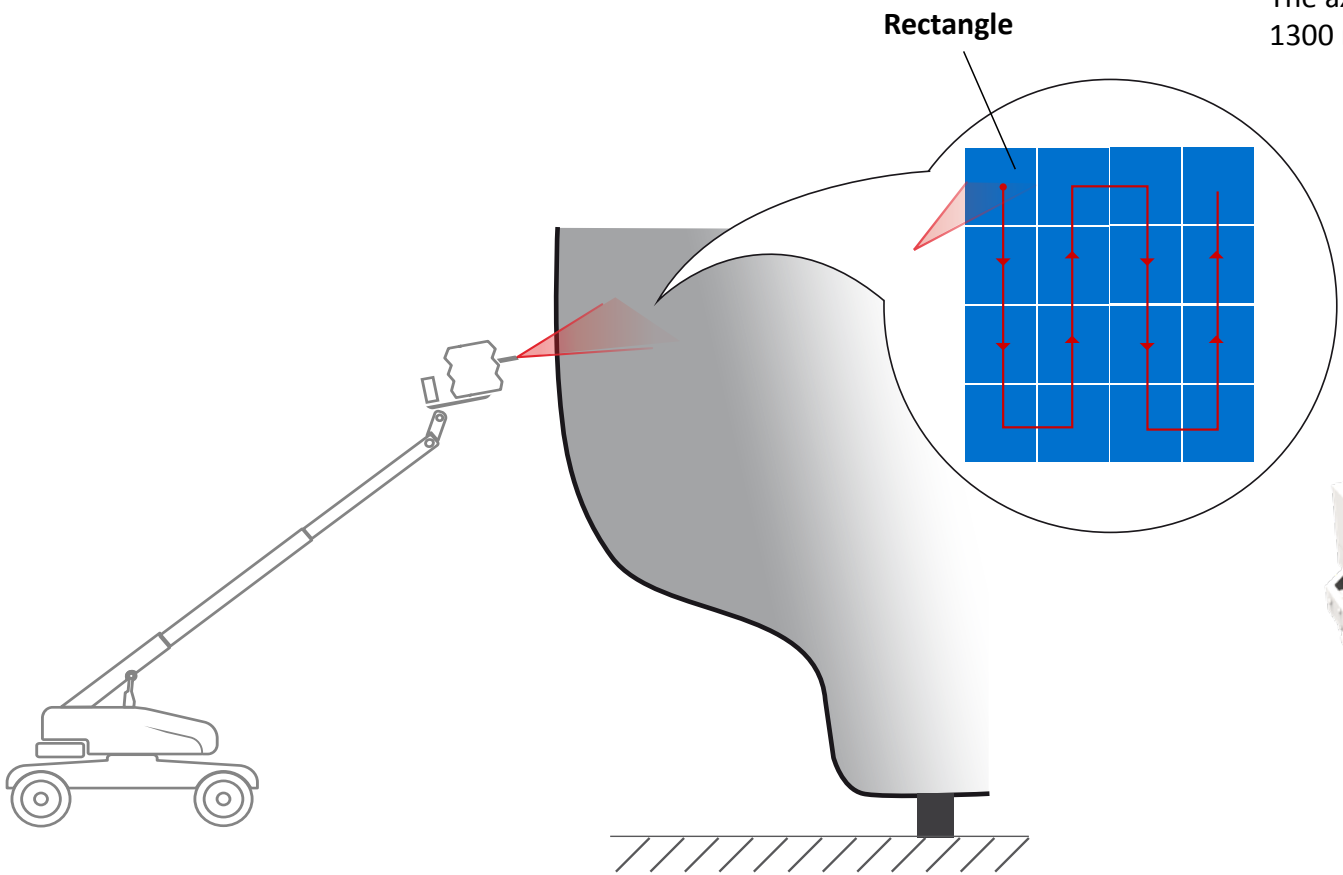
The axes 5, 6, and 8 of the robot ensure correct positioning of the tool relative to the surface to be treated.



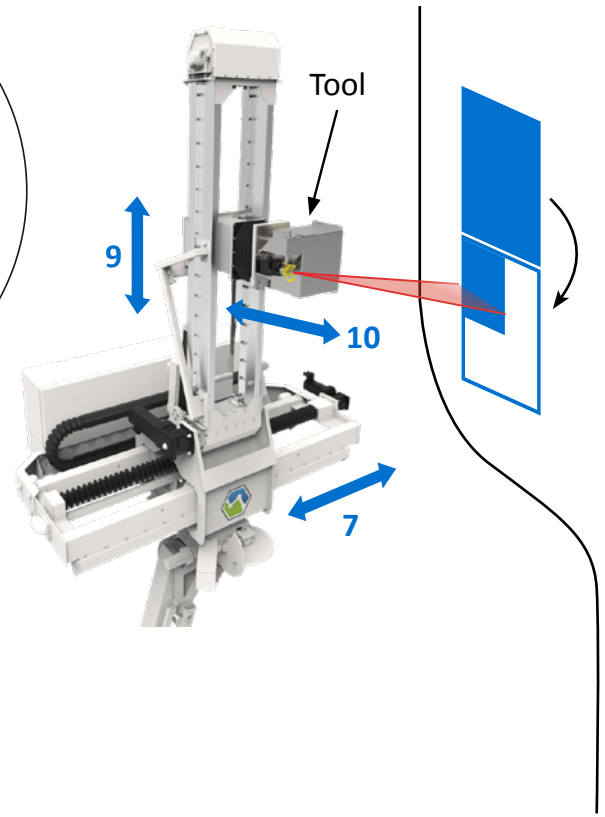


8 = +30° to -45°

1-6 Mapping



The axes 7, 9 and 10 allow the movement of the tool and cover a rectangle of 1300 mm horizontally) and 1200 mm vertically.

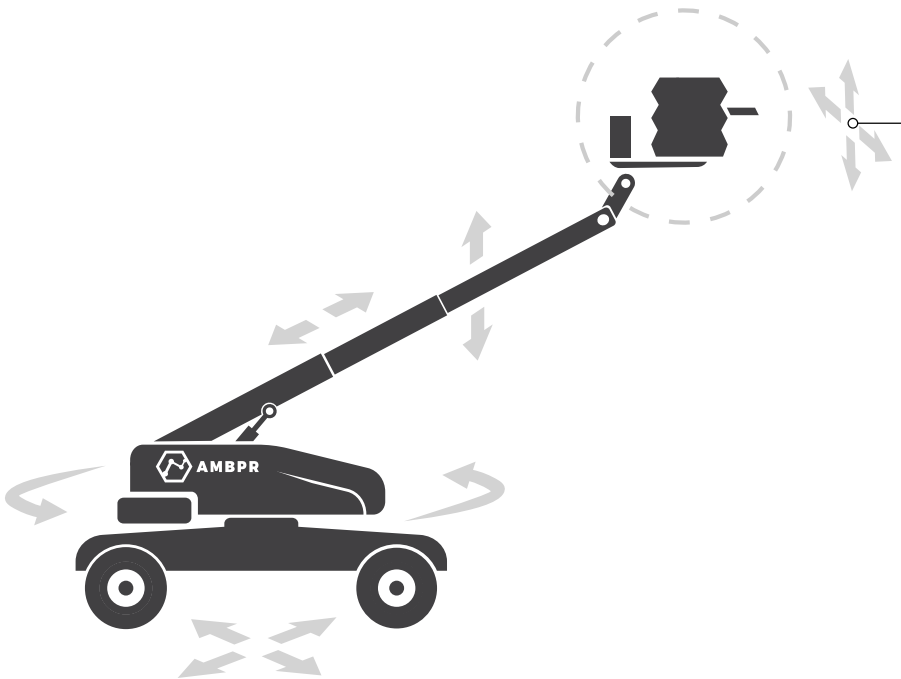


For the treatment of spots, it is possible to configure the 2 dimensions of the rectangle.

The tool moves in the rectangle in succession of vertical bands with an adjustable coverage rate.

Then, the robot moves the application rectangle to make a series of vertical bands from top to bottom.

1-7 Toolholders



Washing

Surface preparation:
- UHP Sandblasting
- Abrasive Sandblasting

Painting

Inspection

1-8 Human Machine Interface

From a remote control and an intuitive interface, the operator can configure the various processes. A single technician thus starts the system and supervises the operation of the robot. The robot then operates autonomously according to the process in place.