



Belrobotics

Leader in the automatic maintenance of large grounds

1	Football pitches
2	Gardens and industrial sites
3	Docking stations

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THE GRASS MASTERS

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Belrobotics

Leader in the automatic maintenance of large grounds

1	Football pitches
a.	Docking station alongside the pitch, without handrail
b.	Docking station in a recess alongside the pitch, without handrail
c.	Docking station on a side section, protected by high fence
d.	Docking station alongside the pitch, behind the handrail
e.	Docking station behind advertisement panels, under handrails
f.	Docking station in a recess next to the pitch, behind high fence

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Installation rules

Wire around the whole pitch: goal nets lifted up before mowing

The diagram shows a green football pitch with white lines for the center circle, half-way line, and goal areas. A yellow rectangular wire is stretched around the entire perimeter of the pitch. At each of the two goalposts, there are two blue dots on the wire, indicating where the goal nets should be lifted up before mowing.

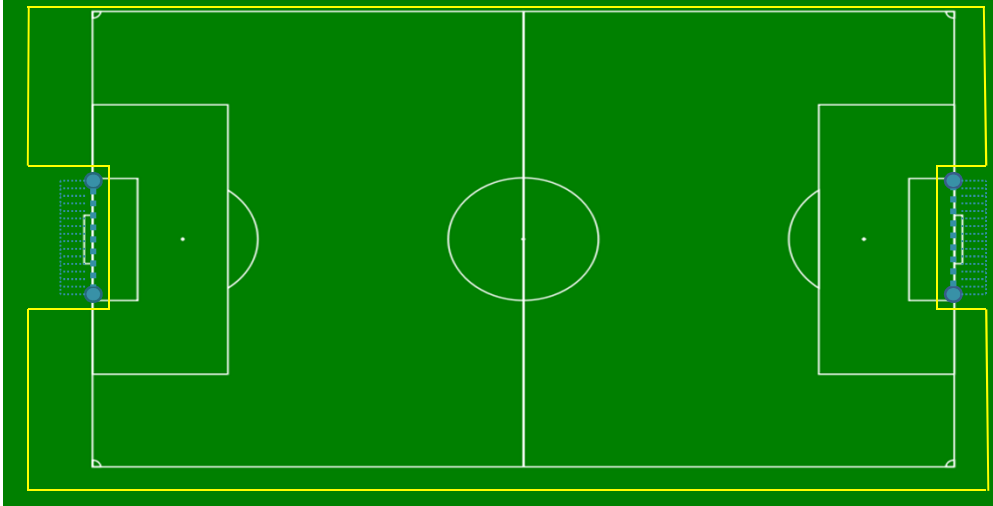
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Installation rules

Wire in front of goals: goal nets maintained in position at all times

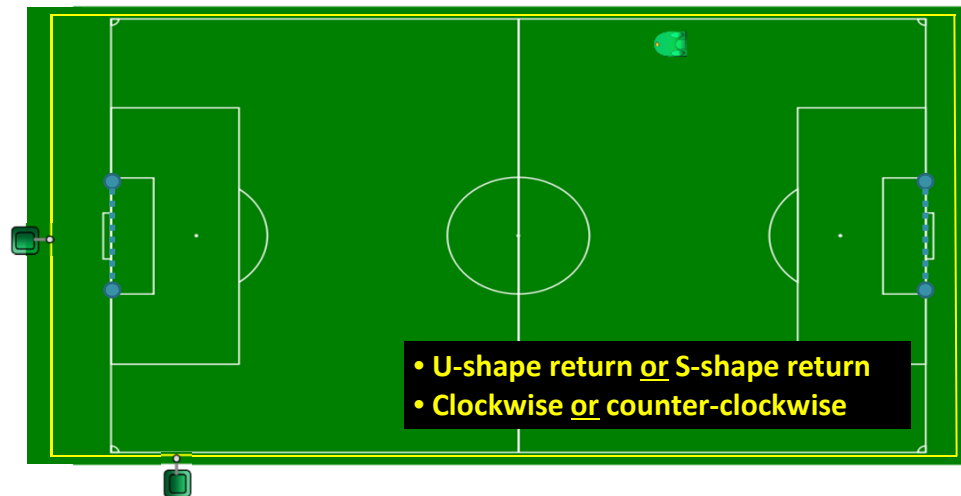


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Installation rules – football pitch

Docking station alongside the pitch without handrail



- U-shape return or S-shape return
- Clockwise or counter-clockwise

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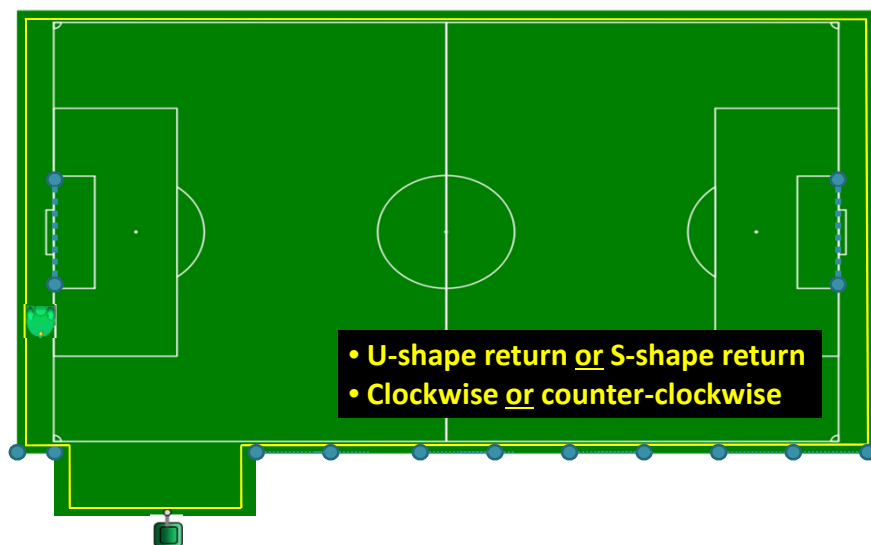
Installation rules – football pitch

Docking station behind goal. Notice lifted up goal nets



Installation rules – football pitch

Docking station in a recess zone without handrail



Installation rules – football pitch

Docking station in a recess zone without hand rail



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Installation rules – football pitch

Docking station on a side section, protected by high fence (1/3)



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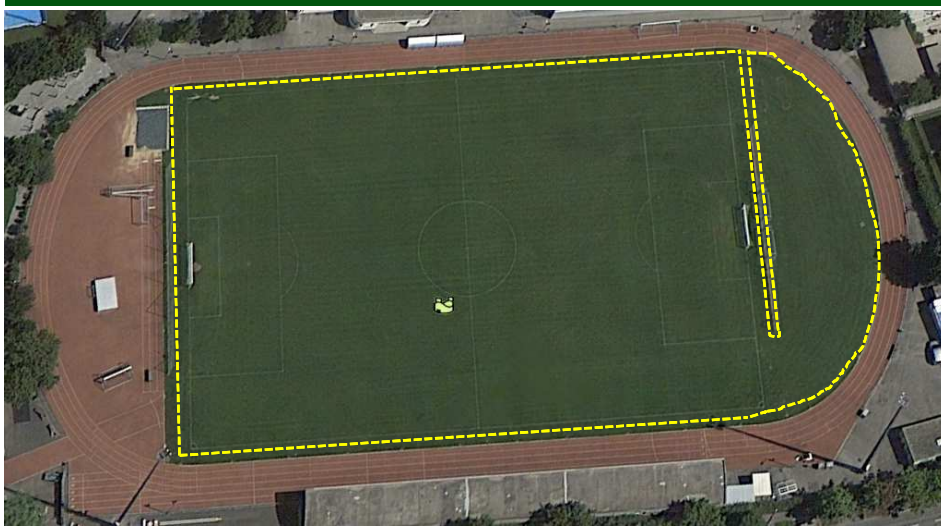
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Station Utogrund, Dennerstrasse, Zurich, CH

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Installation rules – football pitch

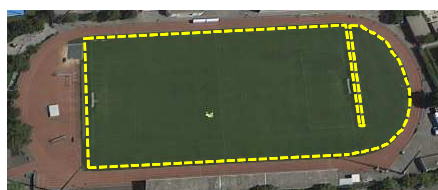
Docking station on a side section, protected by high fence (2/3)



Station Utogrund, Dennerstrasse, Zurich, CH

Installation rules – football pitch

Docking station on a side section, protected by high fence (3/3)



Station Utogrund, Dennerstrasse, Zurich, CH

Installation rules – football pitch

Docking station alongside the pitch, behind the handrail



Neutral zone.
Min. 3 m wide

Distance of 600 mm between peripheral wire and poles supporting hand rail: this is to avoid likely collisions. 600 mm = 530 mm (overshot of Bigmow in operation) plus 70 mm reserve for possible advertisement panels (tarpaulin or hard panels)

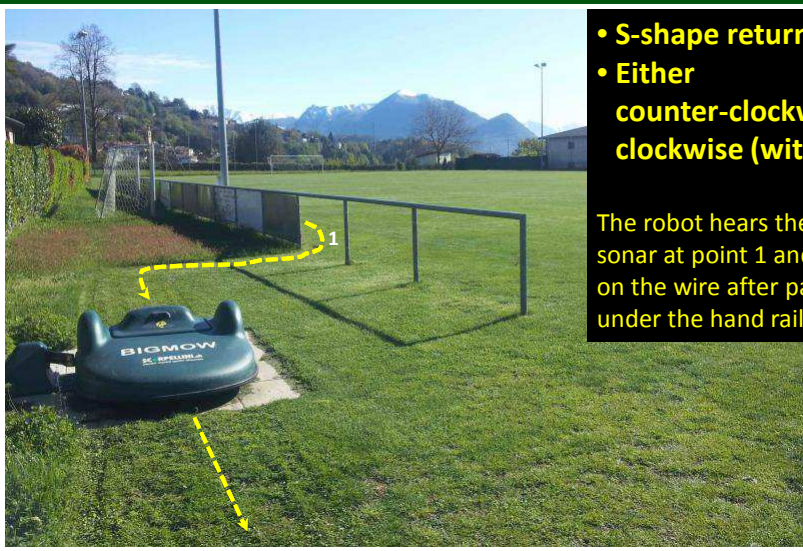
Peripheral wire

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Installation rules – football pitch

Docking station alongside the pitch, behind the handrail



- **S-shape return only**
- **Either counter-clockwise or clockwise (with P9)**

The robot hears the station sonar at point 1 and comes on the wire after passing under the hand rail

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Installation rules – football pitch

Docking station alongside the pitch, behind the handrail

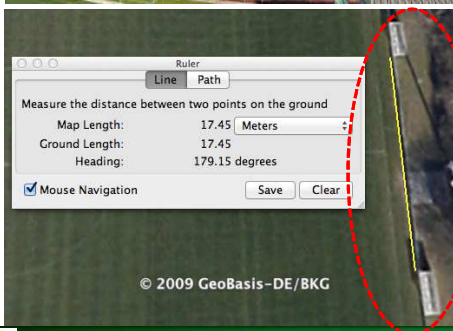


- Standard installation: docking station behind a protection fence integrated in the hand rail
- "S" return shape. Sonar on the docking station
- Appropriate location of wire (entrance close to pole, exit centred between poles)
- Adequate setting of parameters P3, P4, P9
- And of options O010, O011, O013



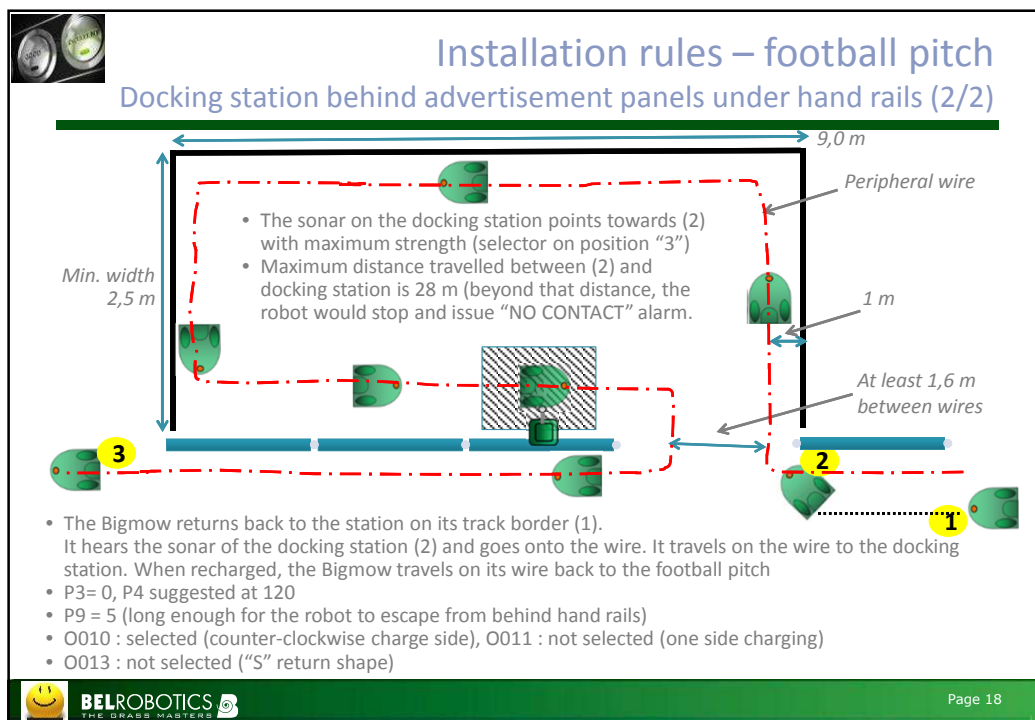
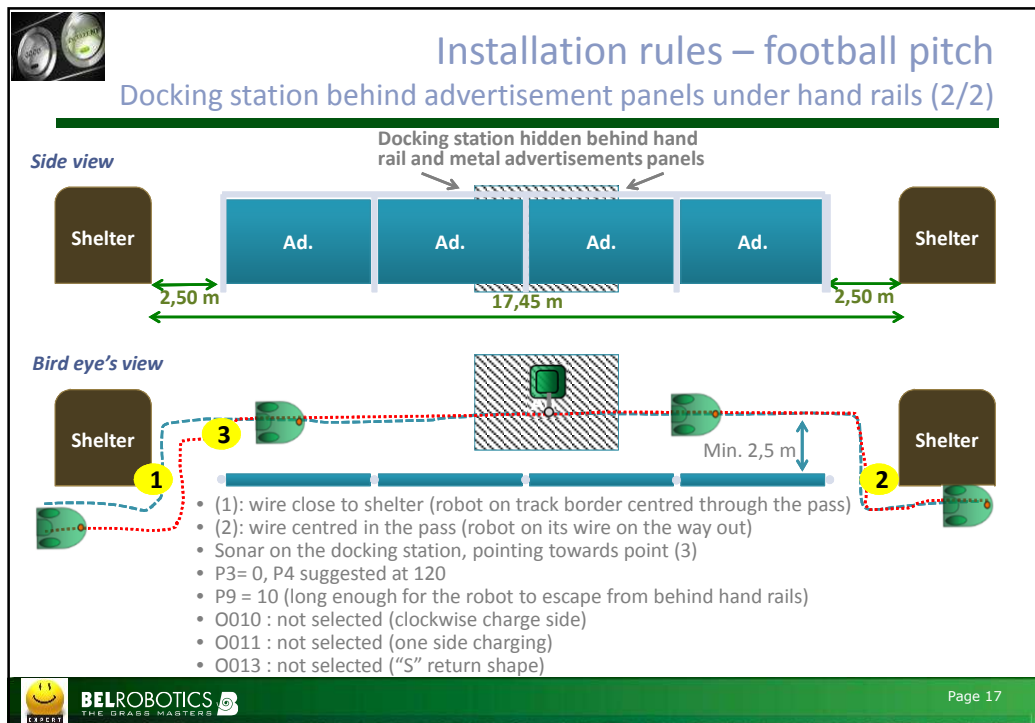
Installation rules – football pitch

Docking station behind advertisement panels under hand rails (1/2)



KommTek reference at Ditzingen, BW, Germany





Installation rules – football pitch

Docking station sheltered by the pitch fence

Dimensions of this configuration were tested extensively with a Bigmow and are shown on next two slides.

Narrow entrance between 2 poles of the fence, on the side of the pitch. The bottom part of the fence was cut off to provide passage for the Bigmow.

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Pictures are from a field in Bielefeld, that is not installed as shown on this slides show

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Installation rules – football pitch

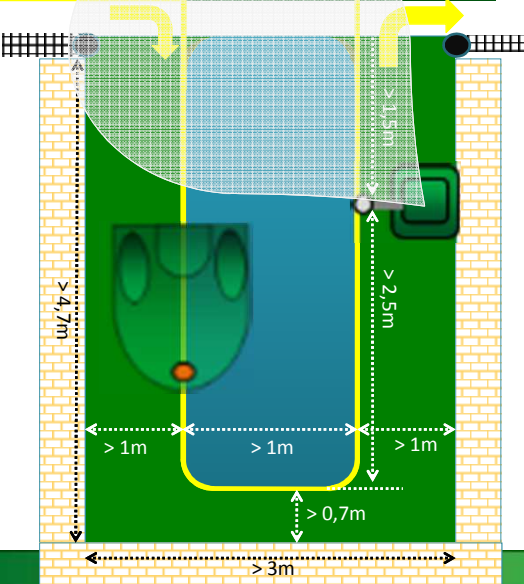
Docking station sheltered by the pitch fence

- Docking station in a small recess (3 m x 4,7 m) between walls.
- **Both dimensions are critical!**
- Narrow enough to be fitted on the side of the pitch between two fence poles
- Large enough to let the Bigmow manoeuvre when it enters the recess while mowing
- Large enough for the Bigmow to travel astride the wire to and from the station
- Sonar of the docking station deported towards the incoming Bigmow
- O010 : not selected (clockwise return)
- O011 : not selected (one side charging)
- O013 : not selected ("S" return shape)
- P09 > O08 (at least 8 m)

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Installation rules – football pitch

Docking station sheltered by the pitch fence

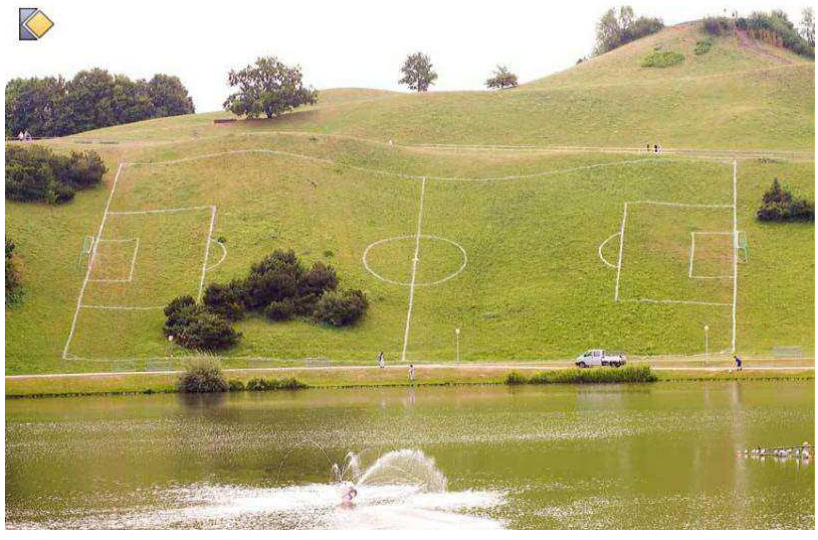


- Docking station in a small recess (3 m x 4,7 m) between walls.
- **Both dimensions are critical!**
- Narrow enough to be fitted on the side of the pitch between two fence poles
- Large enough to let the Bigmow manoeuvre when it enters the recess while mowing
- Large enough for the Bigmow to travel astride the wire to and from the station
- Orient sonar of the docking station towards the incoming Bigmow
- O010 : selected (counter clockwise return)
- O011 : not selected (one side charging)
- O013 : not selected ("S" return shape)
- P09 > 003 (at least 3 m)

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Installation rules – football pitch

Well well ... Go to another prospect!



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2	Gardens and industrial sites

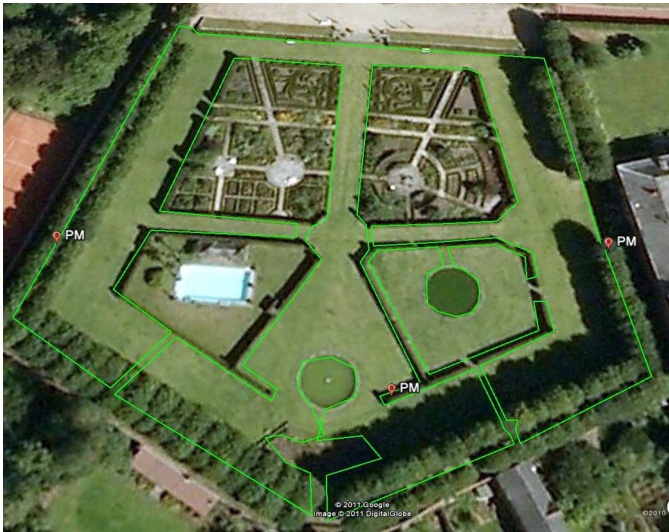
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Garden « à la française »

2 Parcmow

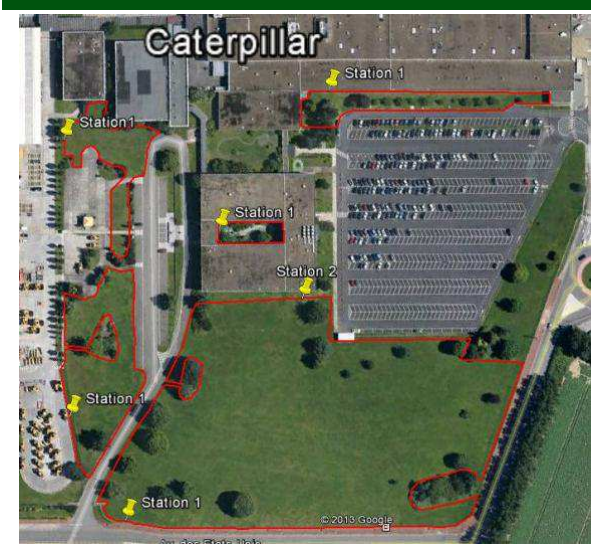


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Caterpillar Industrial Site
Gosselies, Belgium



- 2 Bigmow in one zone
- 3 Parcmow
- 1 Greenmow

All installed in 2011
(old signal)

NRB Industrial Site
Herstal, Belgium (Proposal phase)



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3	Docking stations
a.	Docking station on dedicated pavement
b.	Dedicated open shelters for docking station
c.	Dedicated closed shelters for docking station

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Reference configurations

Position of the docking station on pavement

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Reference configurations

Models of open shelters for docking stations (no remote sonar needed)



- Simple, solid and affordable shelter
- Best behind advertisement panels
- Adequate for "S" shape return. Sonar position unchanged
- Sliding sides to protect the robot during matches from balls and over-curious spectators standing next to the shelter
- Sliding sides to prevent animals to settle down and hibernate in the shelter

Conception and design by KommTek



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Reference configurations

Models of open shelters for docking stations (no remote sonar needed)



- Upgraded version of previous model
- Metal structure
- With hinges

Conception and design by KommTek



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Reference configurations

Models of open shelters for docking stations (no remote sonar needed)



- Luxury shelter
- Metal structure
- Green roof
- Here portrayed in a high-end hotel. Could be used on football pitches as well



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Reference configurations

Models of closed shelters for docking stations (remote sonar needed)



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