

Smart Kart 6

The *Smart* investment



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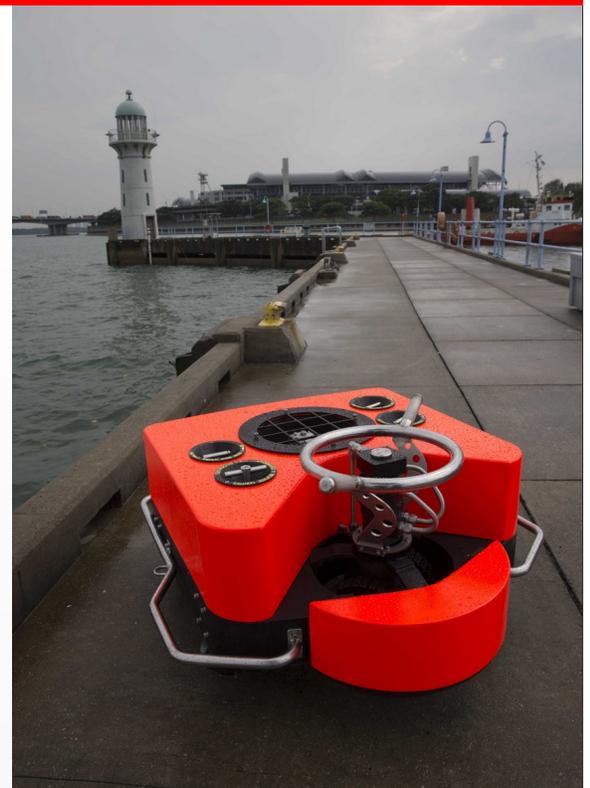
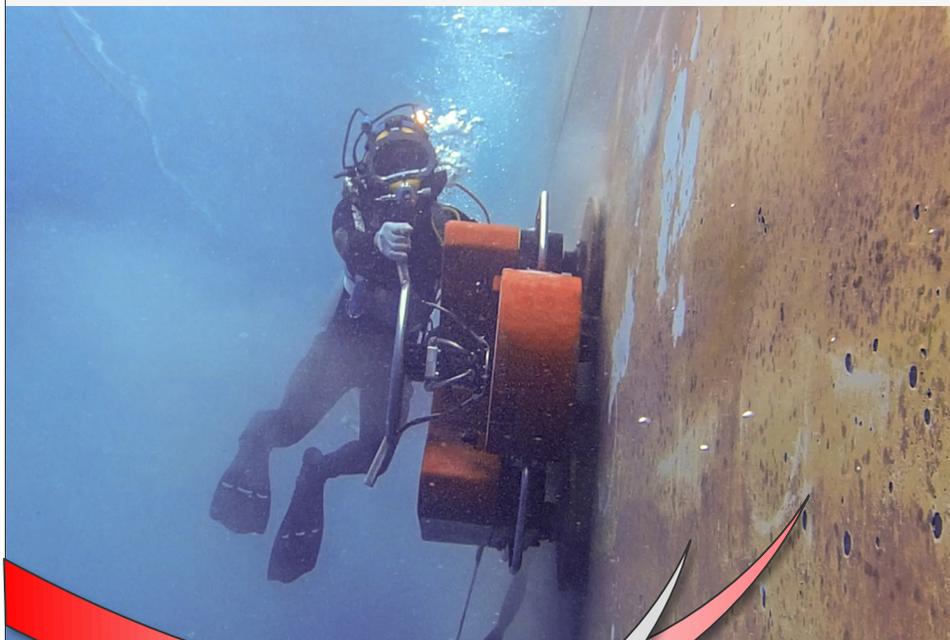
The *Smart Kart 6* is a hydraulically powered, diver-operated underwater grooming and cleaning machine.

It is capable of performing in a safe, reliable, efficient and effective manner due to its clever design. This design is also able to minimise diver fatigue.

What makes our version of a brush kart “*smart*” is down to its very specific and thoughtfully considered design. A design we have taken 25 years to perfect! Our “*smart*” design enables the diver operator to freely adjust settings on the machine to respond to changing conditions experienced during the grooming/cleaning process. All the while, continuing to protect existing antifouling coatings and providing the diver with a machine that is easy and safe to handle.

The “*smart*” construction of the *Smart Kart 6* incorporates the highest quality materials to minimise breakdowns and downtime due to unnecessary wear and tear.

The *Smart Kart 6* is more than just a cleaning machine — it’s also a “*smart*” investment.



Biofouling Solutions Pty Ltd. is focused on creating technology around our three core beliefs:

Safety: to provide tools in a way which promotes and supports safe working practices;

Innovation: to constantly improve and challenge the status quo;

Deliver positive commercial outcomes: by creating equipment which has the ability to increase our customers profit margins.

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Operating on smooth or even surfaces.....

The *Smart Kart 6* has three counter-rotational brushes, two at the front and one at the rear.

When grooming or cleaning uniform flat surfaces, the three brushes rotate together at the same speed, providing the most efficient cleaning footprint (1.6m²).

It also provides a stabilised machine, making it easy and safe for the diver operator to control.

The operating speed of the *Smart Kart 6* is easily controlled via the **Front Drive Control**, while the direction of the machine (forward or backwards) is determined using the **Reverse Control**.

By incorporating a reverse gear, the *Smart Kart 6* has become one of the fastest grooming and/or cleaning machines on the market. The forward and reverse control enables the diver to clean closer to the bow and stern and around niche areas. The reverse feature, along with the *Smart Kart 6*'s **Central Thruster** allow divers to easily manoeuvre out of tight situations, enabling access to areas traditionally avoided with other brush kart designs.



Operating on uneven surfaces.....

The *Smart Kart 6* is very capable of cleaning uneven surfaces such as a vessel's turn of bilge or bulbous bow. The *Smart Kart 6* enables the rear rotational brush to be independently slowed or disengaged (using the **Back Brush Control**). This isolates it from the two counter-rotating front brushes. Slowing or disengaging the rear brush provides the *Smart Kart 6* with the stability required to groom/clean curved and uneven surfaces with supreme control and confidence.

Attaching to the hull of a vessel.....

The *Smart Kart 6* uses its powerful **Central Thruster** for deployment and manoeuvrability in the water column and also, to fix it against a vessel hull. This unique feature sets it apart from other cleaning machines on the market, which tend to rely on the vortex created by their rotational brushes or magnetic wheels for attachment.

The *Smart Kart 6* **Central Thruster** enables the machine to remain safely in position on the hull, even in strong currents. The central thruster has proved to be a great assistant to the diver operator, enabling easy and safe deployment, reducing the need for diver exertion.

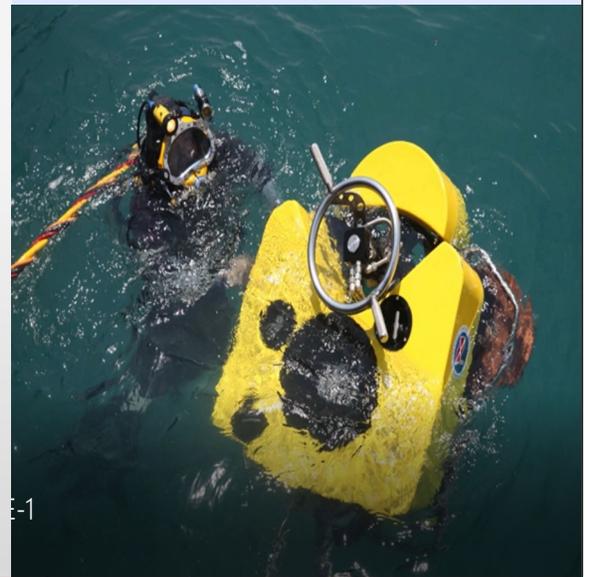
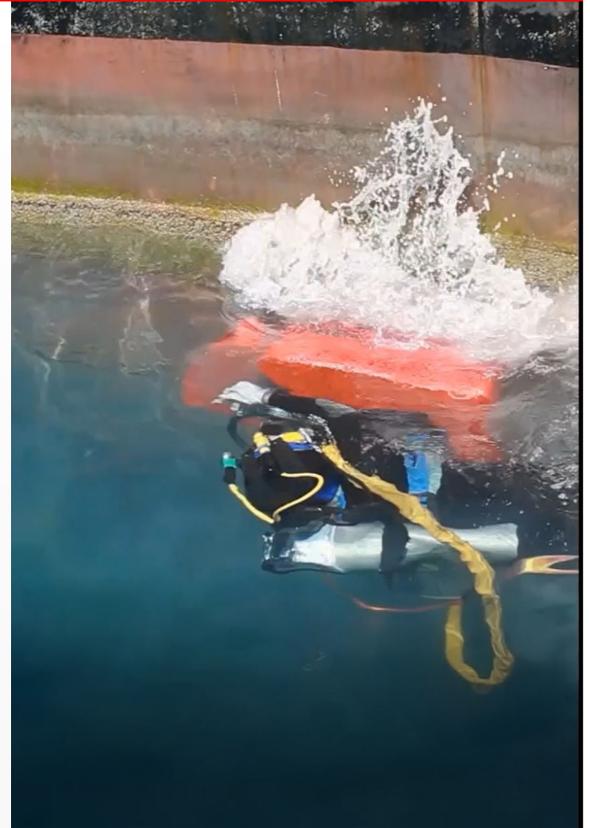
The **Central Thruster** also enables the machine to hold position against the cleaning surface, even when stationary, enabling the divers to rest or change over. The clever **Central Thruster** design is able to minimise diver fatigue as it is easy to manoeuvre in the water when getting it into position.

Cleaning rate.....

The *Smart Kart 6* cleaning rate is dictated by many variables such as:

- Diver experience/training
- Level of biofouling (marine growth)
- Water visibility
- Water currents
- Level of access to cleaning site

The *Smart Kart 6* is capable of grooming/cleaning speeds of ~34.6 m² per minute. It has a cleaning footprint width of 1.43 m and a brush rotation of up to 1,500 rpm. The *Smart Kart 6*'s grooming or cleaning capacity is ~2,075 m² per hour.



Adjusting to changing levels of biofouling (marine growth).....

The speed of the **Central Thruster** can be easily adjusted by the diver via the **Thruster Control**. This inversely effects the speed of the rotating brushes. When the thruster is running fast, all three rotational brushes will run slowly, and vice versa. This enables the operator and machine to tackle varying levels of marine growth. If the marine growth is very light (e.g. slime), the central thruster can be run fast, with slow brush rotation. While heavy marine growth requires a slower central thruster speed and fast brush rotation.

Also, the clever design of the *Smart Kart 6*'s brush holders controls the contact pressure (or downward force) the machine places on the cleaning surface. When the brushes are rotating slowly, the *Smart Kart 6* only applies a light pressure on the hull, despite the increased speed of the central thruster. This is perfect for situations requiring light and gentle grooming such as on a silicone or fouling release coating. Conversely, if heavy growth is encountered, the diver can increase the rotational speed of the brushes which results in greater centrifugal forces causing the brushes to extend outwards towards the hull providing a stronger force against the hull, despite the decreased central thruster speed.

The *Smart Kart 6* has a selection of cleaning brushes available separately, which range from being suited for light grooming of delicate fouling release coatings to heavy duty tough brushes for high levels of hard marine growth.



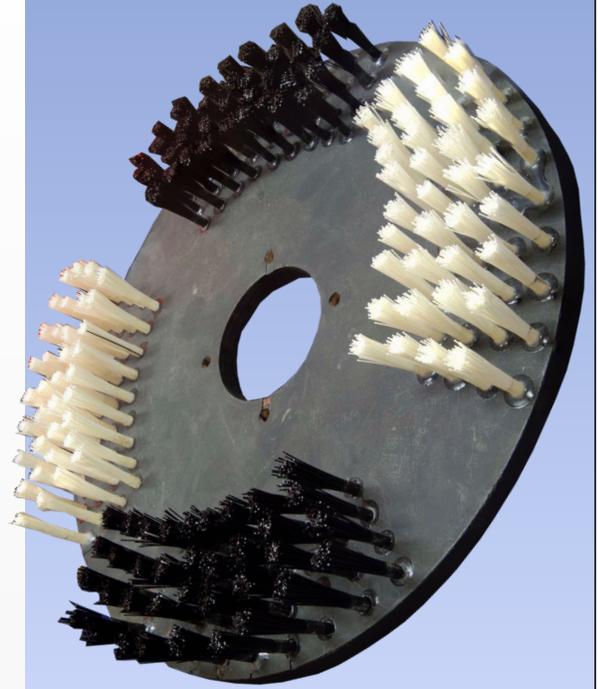
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Cleaning delicate silicone-based Fouling Release Coatings (FRC's).....

Biofouling Solutions believes fouling release coating's can be groomed without damage using the *Smart Kart 6*. The *Smart Kart 6* wheels are specially designed and formulated to provide outstanding traction while being soft enough not to damaging delicate fouling release coatings. The *Smart Kart 6*'s soft nylon 0.69 mm brushes are designed for gentle and non-damaging grooming of fouling release coatings. The unique design of the *Smart Kart 6* enables the operator to decrease the speed of the central thruster which in turn, decreases the speed of the brushes, providing a gentle grooming speed and pressure on the hull.

However, there are limitations to non-damaging cleaning of fouling release coatings. The level of biofouling on the hull must not contain any hard or sharp marine growth such as barnacles or tubeworms. Only primary levels of biofouling (microalgae (<1mm), filamentous algae (<5mm), diatom slimes) should be groomed. If the biofouling contains barnacles, tubeworms and other hard forms of marine growth, then there is a risk that any form of grooming/cleaning with scratch the delicate fouling release coatings.

International Paint has assessed and evaluated the *Smart Kart* hull cleaning equipment for cleaning slime and light weeds. For the evaluation, the *Smart Kart* was using 0.69mm nylon brushes (SK-BSH-001) and rubber wheels (SK-RW-002). The dive company associated, successfully completed International Paint's Intersleek® underwater cleaning panel tests under the supervision of an International Paint Representative and no damage was seen that could be attributed to the cleaning equipment .



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Is the *Smart Kart 6* durable.....

The *Smart Kart 6* is designed in a way to minimise breakdown time. Only the highest quality products are used throughout the machine and it is built to last. The machine exterior is very streamlined with no external hoses or fragile protrusions which tend to become caught up and broken during use.

Unlike most other brush karts which use rubber hydraulic hosing which is susceptible to damage and leaking, the *Smart Kart 6* uses high grade 316 stainless steel for all hydraulic piping, valves, joints, screws, bolts, etc to ensure reliability.

The machine is hydraulically powered, which we believe is still the most reliable method for operating equipment in the marine environment. However, as with all machinery, regular servicing will ensure that the *Smart Kart 6* remains in true working and reliable order.

Will the *Smart Kart 6* leak.....

The *Smart Kart 6*'s internal design has cleverly overcome common problems of most brush kart systems leaking hydraulic oil. With many hydraulically operated machinery, its common for oil leakages to begin occurring when there is a jam (i.e. brushes jammed and not rotating) as hydraulic oil will increase and cause increased pressure at the blockage point. Should such a situation occur, the *Smart Kart 6* is capable of redirecting the hydraulic oil elsewhere, avoiding a build up of pressure and potential blow-out.





Will the *Smart Kart 6*'s buoyancy change over time.....

Unlike most other brush kart systems, which use low quality buoyancy foam that absorbs water over time, the *Smart Kart 6* only uses the highest quality, high density structural foam for internal buoyancy. Hence the *Smart Kart 6* will never absorb water and therefore will maintain neutral buoyancy.

The *Smart Kart 6*'s buoyancy foam is adjustable to cater for the varying salinity levels found around the world's oceans.

Smart Kart 6 — Specifications

- **Size of Unit:** 1.43 x 1.12 x 0.65 m
- **Weight:** 180 kg
- **Weight in Water:** Neutrally buoyant
- **Unit Footprint:** 1.6 m²
- **Cleaning Strip Width:** 1.43 m
- **Cleaning Speed:** 34.6 m²/minute
- **Cleaning Capacity:** 2,075 m²/hour
- **Brushes:** Three counter-rotational brushes (two (2) front, one (1) rear)
- **Brush Rotational Speed:** up to 1,500 rpm
- **Power Supply:** Diesel engine, to supply the hydraulically driven *Smart Kart 6*.
- **Power Supply Requirements:**
 - Motor - >45 Kw; 25 gallon/minute at 1,350 rpm
 - Pump - 40 cc/1,000 rpm
- **Power Supply Hydraulic Fittings:** Pressure 1" NPT; Return 1" NPT (quick connect couplings not included)
- **Operating Pressure:** 100-110 bar (1,450 - 1,595 psi)