



Suction cup energy storage

How does a suction cup work?

During contact of the workpiece and such a suction cup, the air inside the suction cup is pressed out. When the device lifts up, the volume will increase and a vacuum will concomitantly be applied. When there is no leakage, a handling process with nearly no (external) energy consumption would be possible.

What are EA suction cups?

EA suction cups address many shortcomings of widely used vacuum-driven grippers, offering a compact, fully electric, and energy-efficient solution that meets the needs for efficiency and portability in both industrial and service robotics.

How can suction cups improve sealing & attachment stability?

To improve the sealing and attachment stability of suction cups, researchers have employed state-of-the-art techniques, including the use of soft materials with better conformal properties or jamming mechanisms.

What are active suction cups?

C) Active suction cups are widely used thanks to their simple design, versatility, and simple control. They can easily pick objects of different materials and shapes, from flat to curved, with smooth to rough surfaces. However, they require a vacuum infrastructure (vacuum generator, tubes, manifolds, valves) and consume significant power.

How do passively working suction cups reduce energy consumption?

First, passively working suction cups offer an interesting opportunity for reducing energy consumption. During contact of the workpiece and such a suction cup, the air inside the suction cup is pressed out. When the device lifts up, the volume will increase and a vacuum will concomitantly be applied.

How long do EA suction cups hold?

For moderately rough surfaces ($S_q = 1.9 \mu\text{m}$) holding times are ≈ 50 s. These results show that EA suction cups can be used for pick and place applications of smooth to moderately rough objects with weights over 500 g with holding times of tens of seconds, well beyond the typical duration of pick and place cycles (1-5 s).

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Here, we propose an octopus-inspired suction cup that does not require prepressure, has high adhesion strength (56.4 times its weight), and can adapt to rough, oil-contaminated surfaces.

Discover suction cup holders that keep your drinks firmly in place, whether you're on the water, in your RV, or at your desk. Explore durable, anti-tip designs.

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EA suction cups address many shortcomings of widely used vacuum-driven grippers, offering a compact, fully electric, and energy-efficient solution that meets the needs for efficiency and portability in both ...

This letter introduces a novel Rigid-Soft Hybrid Suction Cup (RSH-SC) designed for enhanced stability and energy-efficient attachment in nonideal conditions (i.e., suction on irregular and ...

Abstract Suction cups has been widely utilized to grasp objects, but they typically encounter challenges with sealing failure and non-adjustable adhesion force. In this study, a ...

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