Engineering & Physical Science

TechTransfer and Ventures

High-Temperature Robotic Gripper

Robotic tool able to withstand extreme temperatures

Most high-temperature robotic grippers are either not adaptable to different part geometries or cannot withstand the extreme temperatures seen in metal additive manufacturing, casting, and forging.

Researchers at Virginia Commonwealth University have developed a high-temperature end effector for collaborative robots. The technology supports safer, more flexible and tunable automation of high-temperature manufacturing workflows, particularly for small-batch and custom production environments where traditional automation has been hard to justify.

The Technology

The High-Temperature Robotic Gripper is designed to operate reliably in extreme thermal environments such as metal additive manufacturing, casting, and forging. The device integrates a custom ceramic insulator with adapter assembly to provide both high temperature resistance and robust mechanical performance. The gripper mounts onto standard collaborative robot end effectors via a simple adapter, allowing integration into existing automation setups with minimal modification. Together, these features enable adaptive handling of diverse part geometries in harsh thermal environments where conventional grippers either fail or require costly customization.

(a)

Figure 1. Gripper arm 3D diagram and robotic gripper fitted with a camera for remote control.

Benefits

- High-temperature resistance
- Adjustable ceramic insert shape
- Cost-effective and versatile compared to traditional ceramic constructions

Applications

- Metal additive manufacturing
- Casting and forging processes
- Collaborative robotics

IP Status:

US Patent application filed

License Status:

This technology is available for licensing to industry for further development and commercialization

Category:

Engineering and Physical Science - Devices and Methods

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