Illuminate NEBRASKA
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MECHANICS

MATERIALS

CONCEPT The selection of materials in robotics depends on factors such as the robot's size, weight, power requirements, operating environment, and desired performance criteria. Common materials include metals such as aluminum and steel for structural components and sensors, plastics for lightweight parts, and composites for high-strength and durability. Soft materials such as silicone and rubber are also increasingly being used.

BACKGROUND

Early 20th century robots were made primarily of steel and other heavy metals due to their strength and durability. In the 1960s and 1970s robots became more sophisticated, incorporating lighter materials such as aluminum and plastics in their design. In the 1980s and 1990s, advancements in materials science led to the development of new composites, such as carbon fiber, which provided even greater strength and durability while reducing weight. In recent years, there has been a growing interest in soft materials such as silicone and rubber and piezoelectric materials, which offer new capabilities and functionalities for robotics applications.

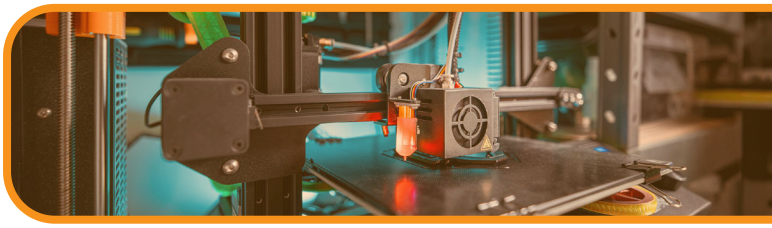
Make sure it measures up

APPLICATION

Soft materials such as silicone, rubber, and elastomers are increasingly being used in the construction of prosthetic limbs to improve comfort, flexibility, and adaptability for the user. Psyonic, a leader in bionic prosthetics, has developed a soft robotic hand that can conform to and grasp a wide range of objects. Their Ability Hand includes the world's first finger-tip tactile response pressure sensors which provide the user with vibration response. This allows the user to feel what they are doing such as grasping a raspberry or egg shell without crushing it.

By using soft materials, the robotic hand can mimic the dexterity and flexibility of a human hand, providing a more natural and intuitive experience for the user. The use of soft materials in the prosthetic hand reduces the risk of injury or discomfort to the user, as compared to traditional prosthetics made of hard materials. It's poly carbonate shell gives strength while the hand itself is waterproof and can withstand fire for a short period of time.

This application demonstrates the potential of materials used in robotics to improve the functionality and usability of prosthetic devices, ultimately enhancing the quality of life for individuals with disabilities.



EXAMPLES

STRUCTURAL MATERIALS: Metals such as aluminum, steel, and titanium, which are used for the robot's framework and other structural components.

PLASTICS: Polycarbonate, ABS, and nylon are used in the manufacturing of the robot's outer shell and other non-structural components.

COMPOSITES: Carbon fiber and fiberglass are used in the production of high-strength and durable components, including robot arms.

SOFT MATERIALS: Silicone and rubber are used for grippers, sensors, and other applications where flexibility and adaptability are required.

SMART MATERIALS: Shape-memory alloys and piezoelectric materials are used in robotic applications that require precise control and responsiveness to external stimuli.

3D PRINTING MATERIALS: Thermoplastics and metals, allow for the production of complex geometries and customized parts that are not possible with traditional manufacturing techniques.