SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

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Department of Biomedical Engineering

ROBOTICS AND AUTOMATION IN MEDICINE

III Year : VI Semester

TITLE : DESIGN CONSIDERATION IN VACUUM AND OTHER METHODS OF GRIPPING

DESIGN CONSIDERATION

Designing a vacuum system involves careful consideration of various factors to ensure its efficiency, reliability, and safety.

Vacuum Source:

Choose an appropriate vacuum source based on the application requirements. Consider factors such as vacuum pump capacity, pressure levels, and the type of pump (e.g., rotary vane, diaphragm)

Seal Design:

Design effective sealing mechanisms to ensure a tight grip and prevent air leakage. Proper seals are crucial for maintaining vacuum pressure and ensuring efficient operation.

Material Compatibility:

Ensure that the materials used in the vacuum system, including seals and suction cups, are compatible with the objects being handled. Certain materials may not provide a proper seal on specific surfaces.

Suction Cup Selection:

Choose suction cups with the right material, size, and shape for the application. Soft materials may be suitable for delicate objects, while larger cups may be required for heavier loads.

DESIGN CONSIDERATION

Vacuum Level Monitoring:

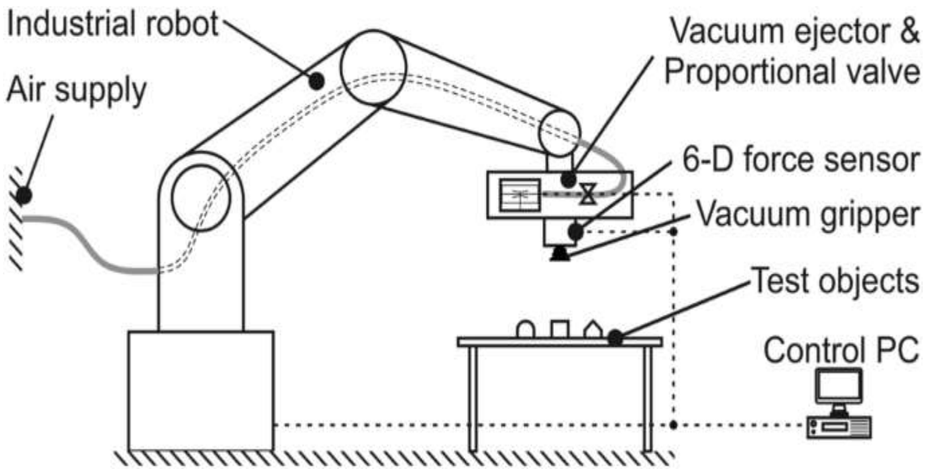
Implement sensors to monitor the vacuum level in the system. This allows for real-time feedback on the gripping force and helps detect any issues such as leaks or fluctuations.

Adjustable Parameters:

Design the vacuum system to be adjustable for different applications. This may include adjustable suction force or other parameters to accommodate a variety of objects.

Energy Efficiency:

Optimize the design for energy efficiency. Minimize air consumption and ensure that the vacuum system operates efficiently to conserve energy.



DESIGN CONSIDERATION

Leak Detection and Prevention:

Incorporate features for leak detection and prevention. Regularly check for leaks in the system and implement measures to minimize the risk of air leakage.

Object Shape and Size:

Consider the shape, size, and weight of the objects to be gripped. Design the vacuum system to accommodate various object geometries and weights.

Release Mechanism:

Implement a reliable release mechanism to safely and quickly release the gripped object when needed. This is crucial for automated systems where precise control is essential.

Dust and Debris Handling:

Consider the presence of dust and debris in the environment. Design filters and protective measures to prevent the entry of contaminants that could affect the performance of the vacuum system.

DESIGN CONSIDERATION

Temperature Considerations:

Take into account temperature variations in the operating environment. Extreme temperatures can affect the performance of the vacuum system, so design components to withstand temperature fluctuations.

Cycle Time and Throughput:

Optimize the system for efficient cycle times and high throughput. This is particularly important in automated processes where speed and productivity are critical.

Maintenance Accessibility:

Design the system to be easily accessible for maintenance tasks. Regular maintenance is essential to ensure the longevity and reliability of the vacuum system.

Safety Measures:

Implement safety features to prevent accidents or damage. This may include emergency stop mechanisms and fail-safe designs.

OTHER METHODS OF GRIPPING

Mechanical Grippers:

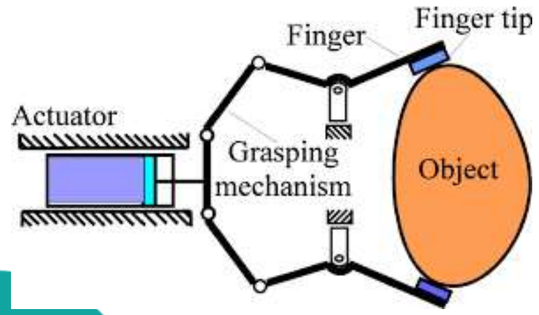
Utilize mechanical grippers with adjustable jaws to securely hold objects. These are suitable for applications where vacuum gripping may not be effective.

Magnetic Grippers:

Magnetic grippers can be used for ferrous objects. Consider the magnetic strength and surface compatibility for efficient gripping.

Adhesive Gripping:

Adhesive-based gripping methods can be employed for certain applications. Design the adhesive material to be strong enough to hold the object securely.



OTHER METHODS OF GRIPPING

Clamping Systems:

Implement clamping systems for rigid objects. Consider the material and design of the clamps for optimal performance.

Combinations of Gripping Methods:

In some cases, a combination of gripping methods (hybrid systems) may provide better results. For example, using vacuum and mechanical grippers together for added stability.


THANK
YOU!