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Dear customer,

IPR Robotics publishes Hands and Feet News with the goal of sharing the latest news on products and technology, plus design and build methods for robot accessories and motion.

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Design Matters
The Art of Gripper Selection

When it comes to selecting the right gripper for your application, it’s important to include gripper selection early in the design process, and to include the following steps in your decision-making process.

PART WEIGHT
This plays an important role when you are using a squeeze type of gripping. The weight has a direct effect on the grip force required. It is also important when the acceleration provided by the robot being considered in the equation.

FINGER DESIGN
Squeeze grip: If you are using squeezing force to hold the part between the fingers, it is recommended to use a 10:1 ratio in determining the right grip force. So if your part weighs 5 pounds, then you would need a gripper that can generate 50 pounds of force per finger. Remember that the grip force drops off when sliding metal is used for bearing support and as the fingers get longer. Most gripper manufacturers supply finger length guidelines.

Cradle/capture grip: Here the part is only captured between the fingers and little or no squeezing is applied to the part. The grip force plays a much smaller part in choosing the gripper. The grippers’ bearing support for the jaws is a far more important factor, because in this scenario the weight of the part is being held by the fingers.

The length: Most gripper manufacturers supply the maximum finger length that should be used on a gripper model. They have already done the calculation of the maximum moment load that could be applied to the gripper and have translated it into a maximum finger length. The calculation is simple; Moment = force x finger length. If you follow their recommendations you will rarely have a faulty application.

REPEATABILITY REQUIRED
Repeatability is important when picking or placing the part accurately, over and over is critical. In these applications, gripper design is very important. If a gripper uses linkage to operate the jaws, its repeatability will degrade during its use, due to wear. When the gripper no longer positions the part accurately a crash condition could result.
GRIPPER STROKE
The stroke needed for the gripper is relative to the application. Typically you need enough stroke to clear the part when the gripper is positioned to grip the part. Too much stroke can cause interference problems and increase the time required to open and close the gripper. When using one gripper for two or three different size parts, you need enough stroke to clear the largest part.

ENVIRONMENT
Clean conditions are simple, not much to consider here. Dirty conditions are where the wrong gripper will have a very short life. Consider the ball and roller bearing designs, if grime, dust and chips work into the bearings, it will cause premature wear. Sealed designs with wipers and seals are better choices.

OTHER ISSUES TO CONSIDER
• Clean Room applications
• Corrosive conditions such as DI water
• Temperature; High heat or cold
• Air quality; Lube or Non-lube

Choosing the right gripper requires knowing your application and surrounding conditions, then using the appropriate design concepts of grippers. Many manufacturers of grippers already have in-house application engineers that can help in your decision process. You should use these resources as much as possible since in most cases it is free.

The design team at IPR can help with gripper selection and system design. Contact Dan Peretz today for a free quote.

Maintenance Tip
Shop Safety - A Simple Guide

Did you know?
• 1.1 million working people suffer from work-related illness
• 4,609 workers were killed on the job in 2012
• 27 million working days were lost due to work-related illness and workplace injury
• Workplace injuries and ill health (excluding cancer) cost society an estimated $13.4 billion in 2010/11

The hazards associated with shop work require special safety considerations. Plus, there are laws that must be followed in order to avoid fines and reduce risk.

By law, employers must:
• Inform employees about hazards through training, labels, alarms, color-coded systems, chemical information sheets and other methods
• Keep accurate records of work-related Injuries and illnesses
• Perform tests in the workplace, such as air sampling, required by some OSHA standards
• Provide hearing exams or other medical tests required by OSHA standards
• Post OSHA citations, injury and illness data, and the OSHA poster in the workplace where workers will see them
• Notify OSHA within 8 hours of a workplace incident in which there is a death, or when three or more workers go to a hospital
• Not discriminate or retaliate against a worker for using their rights under the law.
• Never work if you are tired; Take frequent breaks to stay alert.
• Never use compressed air greater than 30 psi pressure for cleaning equipment
• Never use compressed air to clean skin or clothing
• Always complete general and shop-specific training before using facility
• Always wear personal protective equipment (PPE), including safety glasses or face protection

Upcoming Events:
25th National Robot Safety Conference
October 14-16
Indianapolis Marriott East
Indianapolis, IN

The Assembly Show
October 28-30
Donald R. Stevens Convention Center
Booth #836
Rosemont, IL

Hands and Feet News is archived online. CLICK HERE to view previous issues, including maintenance and design tips, plus real-world application stories!
• Always remove jewelry before working—including rings, necklaces, bracelets, and watches
• Always clear dust and debris before and after machine use; a clean machine is a safe machine
• Always keep aisles, exits, and access to emergency equipment clear
• Always immediately report all problems or concerns to the supervisor

Safety is everyone’s responsibility. You can reduce the risk of injuries by observing your surrounding areas and reporting any problems or concerns.

Product Insight

RPW Series 2-Jaw Parallel Grippers

The IPR Robotics RPW Gripper Series offers a range of 2-Jaw Parallel grippers that provide a reliable low profile device with the option of synchronous or non-synchronous gripping motion. There are 8 sizes of RPW Grippers, ranging in stroke from 19 mm (.75") to 114 mm (4.5") and with grip force from 34.8 lbs. to 348 lbs.

The operating principle of the RPW Series is that the parallel movement of the jaws is generated by two double-acting pistons that are synchronized by an internal pinion/rack. Hardened precision stainless steel shafts are supported by self-lubricating, oil impregnated bronze bushings, ensuring smooth linear motion of the jaws. The unit can be made non-synchronous by removing the internal gear, making it possible to pick and place at a point other than the center of the gripper.

The jaws have features for mounting fingers suitable for the specific application with the wide body allowing for gripping of large and wide parts. The sealed design repels chips and other particulates from the internal drive mechanism.

Available options include sensor mounting kits, sensors, and fail safe check valves.

Learn more about IPR RPW Series 2-Jaw Parallel Grippers

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