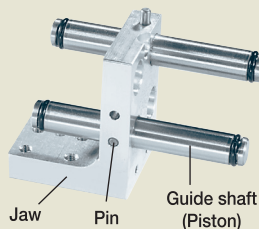
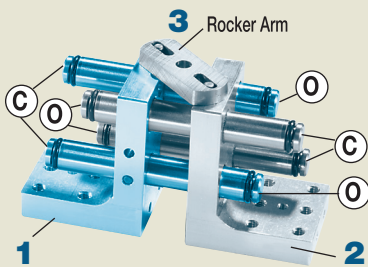


# Rectifying the design limitations of conventional pneumatic grippers with a radical new approach

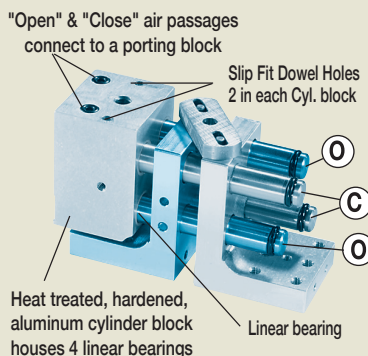
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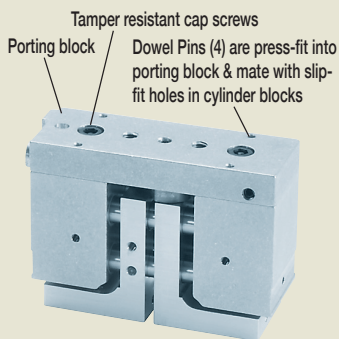
**Jaw construction**



**Three moving parts**



**Cylinder block**



**Porting block**

## A simple approach using only three (3) moving parts!

### Jaw construction

A pair of ground, stainless steel guide shafts (which double as air pistons) are press fit and pinned to each gripper jaw. Shafts are placed diagonally and spaced far apart for maximum jaw stability.

### A rocker arm links the two jaws.

The two jaw units are linked by the third moving part, a rocker arm that synchronizes jaw motion. The arm does not drive the jaws so wear is minimal. The shaft (pistons) of each jaw pass freely through enlarged holes in its mate. "C" in the photo indicates the opposing piston faces to which air pressure is applied for jaw closing. "O" targets the opposing "jaw open" faces.

### Cylinder block houses the jaw assembly's pistons.

Four cylinders are bored in each of two blocks and connected by internal air passages to "C" and "O". The cylinders incorporate permanently lubricated, high-performance linear bearings that provide clean, drip-proof operation and allow use of a non-lubricated air supply. Opening and closing forces are equal, allowing the grippers to be used for both OD & ID gripping. There are no troublesome gibs to wear or adjust.

### Porting block ties cylinder blocks in place.

Four dowel pins align the porting block perfectly with the cylinder blocks. Eight high-performance linear bearings guide the four pistons through the entire length of the gripper body. Centering accuracy is maintained to .002" and side play is .0015" or less per jaw.

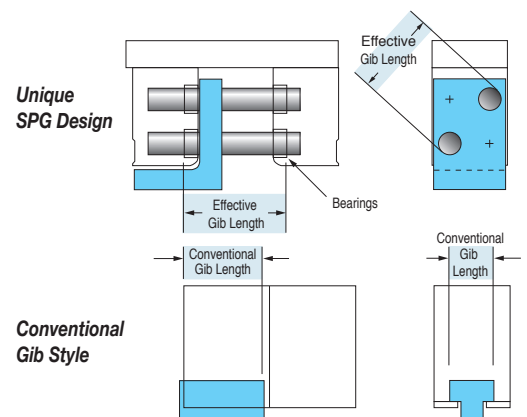


*Model SPG300 gripper shown with straight jaws*

## Seven (7) design flaws solved with the SPG

**Problem #1:** Many grippers have a "metal on metal" sliding gib in a "T" slot.

**Solution:** SPG Gripper jaws are guided by four stainless steel guide shafts supported by eight high-performance linear bearings.



**Figure 1.**

**Long Term Performance** – SPG guide shafts are placed far apart for sturdy "play free" jaw support. Gib type designs have metal-to-metal sliding contact and a narrow support area that can deflect and cause play.

## Seven design flaws solved (continued)

### Problem #2:

Conventional grippers place the power cylinder some distance above the jaw. The jaw is driven by a "linkage" that creates a "bending moment" which results in loss of force and creates wear points for future maintenance headaches.

### Solution:

SPG Gripper jaws are powered directly by air pressure applied to the ends of the guide shafts which act as pistons. Four equal pistons power the jaws inward; four equal pistons power the jaws outward.

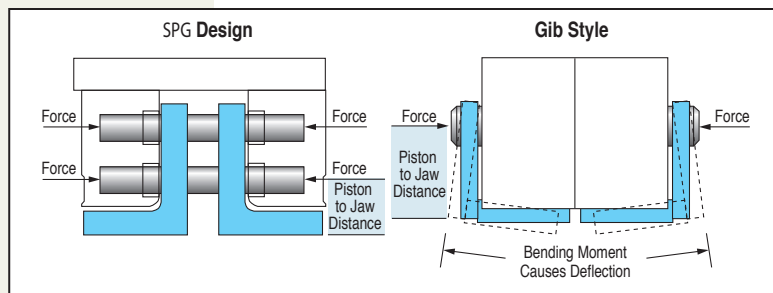


Figure 2.

**Reduced Jaw Deflection** – SPG Grippers have eliminated complex piston-to-jaw linkages and gibs. Bending moments are significantly reduced because force is applied directly to the jaw units at a distance very close to the gripping surface. Loss of force is minimized. Opening & closing forces are equal for use with either ID or OD gripping.

### Problem #3:

It is difficult to attach tooling to many of the conventional gripper jaws.

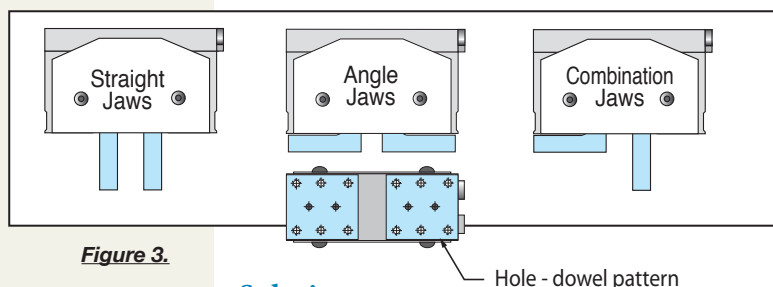


Figure 3.

### Solution:

SPG Grippers offer three jaw styles for easy attachment of tooling. All SPG Gripper jaws have three rows of tapped mounting holes and dowel holes for increased mounting versatility (shown in center). Jaws are available in either steel or aluminum.

### (a) Straight Jaws–

Are ideal for attaching blade type gripping fingers. Straight jaws (Figure 4) provide flat mounting surfaces for inexpensive fingers with pockets used to grip rectangular parts.

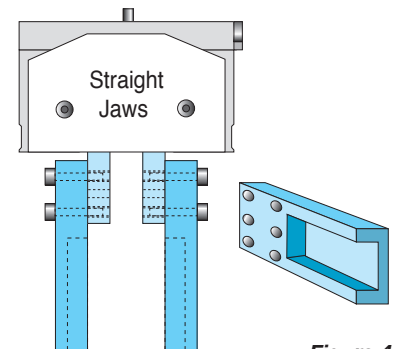


Figure 4.

### (b) Angle Jaws–

Have a slip fit dowel hole and a slip fit dowel slot, assuring precise slip fit attachment of end tooling without the expense of maintaining perfect dowel centerlines. In Figure 5, the angle jaws and a pair of easy-to-make "Vee Blocks" are used for gripping cylindrical parts.

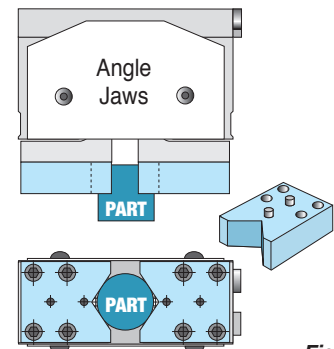


Figure 5.

**(c) Interface blocks** – Can be attached to angle jaws allowing tooling to be mounted on any side of the SPG Gripper. Below in Figure 6, standard interface blocks have been utilized to provide side tapped holes for mounting offset blade type gripping fingers.

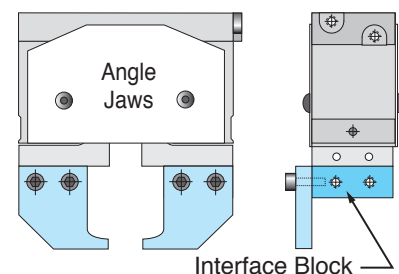


Figure 6.

## Seven design flaws solved (continued)

### Problem #4:

Many grippers are difficult to attach to a mating actuator arm.

### Solution:

SPG Grippers can be easily doweled into mounting surfaces with either of two approaches.

#### Approach #1.

Use SPG Gripper "Option A" that provides a locating dowel on top center of the gripper. Machine a slip fit channel .030" deep into customer's tooling to accept gripper dimension "B". "B" is machined to a tolerance of  $\pm .001$  on all SPG Models.

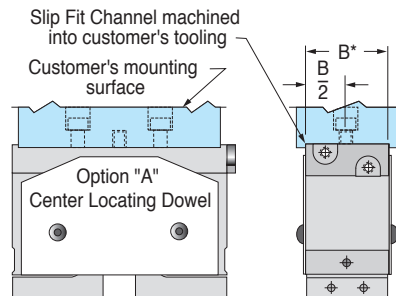


Figure 7.

Gripper mounting is accomplished by "slipping" the gripper's dowel into a slip fit dowel hole and pushing the gripper into the machined channel. Removal is easy and does not require "prying" the gripper off of two "stuck" dowel holes.

#### Approach #2.

The second method utilizes the slip fit dowel slot that is included with the center locating dowel pin "Option A".

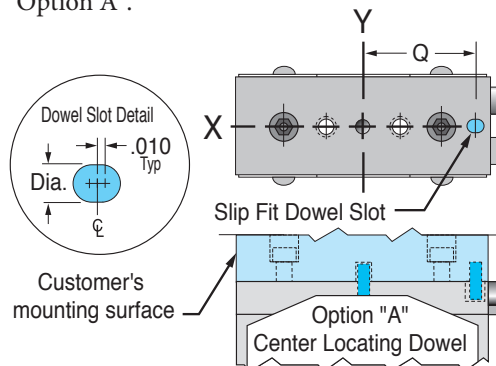


Figure 8.

The center dowel pin establishes the gripper centerline on an X-Y plane. The end dowel locates the X Axis preventing rotation. The "Q" dimension is not critical. It can be held to  $\pm .005$  and still provide precision engagement in the gripper dowel slot.

### Problem #5:

Most grippers do not hold tolerances close enough that a replacement gripper can be installed without major readjustment and realignment.

### Solution:

SPG Grippers are very precisely machined on a specially tooled 4-axis CNC machining center. Fabco-Air does 100% of the manufacturing in-house, insuring that SPG Grippers interchange perfectly with each other.

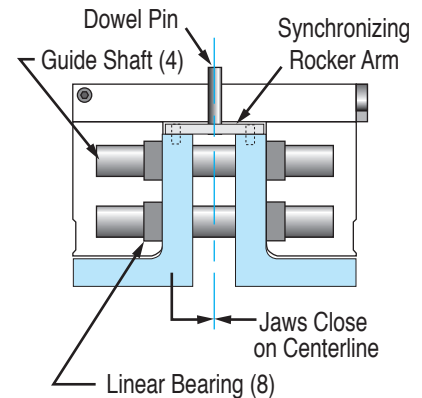


Figure 9.

SPG Gripper jaws close completely together against one another, establishing gripper centerline. The dowel pin, on which the rocker arm pivots to establish centering, serves a dual purpose. It also is the dowel that the customer uses to engage his tooling. Thus, all centerlines are one and the same!!



## Design flaws solved (continued)

### Problem #6:

Most grippers are difficult to repair.

### Solution:

SPG Grippers have only three (3) moving parts, and six (6) total! An easy repair if ever needed.

Left and right jaws are identical. Left and right cylinder blocks are identical. Porting block is doweled to cylinder blocks. They can be disassembled and reassembled in minutes – literally! No adjusting of gibs. No "timing" or "synchronization" of mating parts. Replacement of wear parts is generally limited to seals and possibly the synchronizing rocker arm!

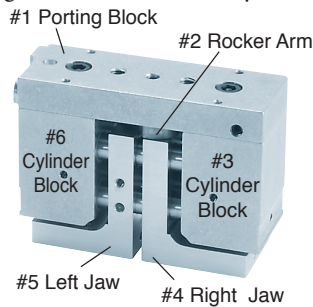


Figure 10.

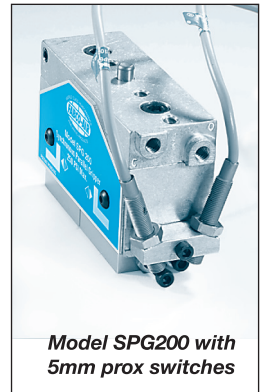
### Problem #7:

Verifying parts presence or gauging part size is difficult with conventional designs.

### Solution:

The symmetrical nature of the SPG Gripper allows a pair of prox sensors to be installed on each end.

Two sensors on one side of the gripper are used to verify full open and full close jaw positions. The two sensors on the opposite side can be set so that each one is "just made" when a part is gripped. An oversize, undersize, or missing part will cause enough jaw travel that one of the two sensors will "drop out", indicating a "no go" situation. If both sensors are "made", a gripped part is present and within tolerance.



Model SPG200 with 5mm prox switches

### We make specials too – Here's one

#### Three position jaws.

Fabco-Air has made three-position grippers by including a tandem piston at one end of the gripper. Line pressure applied to this tandem piston overrides "Jaw Open" force – and will position the jaws in a "mid" location. From this "mid" position, the jaws can be either opened or closed allowing I.D. or O.D. gripping if a family of parts is to be handled with the same gripper.

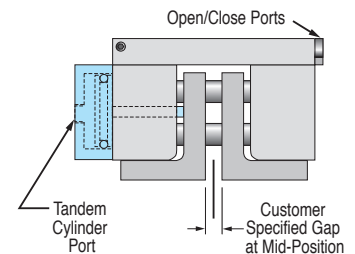


Figure 12.

## about FABCO-AIR



One of Fabco-Air's 24/7 lights-out machining centers

Fabco has all the popular off-the-shelf pneumatic components you want, ready for immediate shipment. Yet almost half of our business comes from helping customers solve design problems with special pneumatic solutions. We can design, prototype and deliver custom samples within 72 hours! **Fabco-Air solves problems. Let us help!**

## FABCO-AIR since 1958

With operations housed in 61,000 sq. ft. in Gainesville, Florida, Fabco is dedicated to developing and providing advanced fluid power technology to give our customers the competitive edge they need in their field.

24/7 lights-out precision machining centers drive production, assure product quality and enable reliable delivery.

