

Advance YOUR Productivity with... Power Workholding



Increasing the accuracy and repeatability of a manufacturing process will produce a higher quality product, reduce scrap, and achieve the ultimate goal...profit.

Hydraulic workholding devices provide a consistent, repeatable force in a relatively small weight and size envelope. This means that in today's manufacturing environment the work piece can be secured in less time, more accurately and without sacrificing valuable fixture space. Hydraulic power clamping also optimizes the loading and unloading of the parts process.

The information contained in this brochure is intended to introduce you to the basics of power workholding, plus the product line and services of Vektek. If you currently use manual fixturing and need to increase accuracy, repeatability and speed, power workholding may be in your future.

We have discovered that successfully implementing the development process of a power workholding system is a Team effort. This collaboration consists of: Team Vektek, possibly an outside fixture designer, and you...the customer.

Team Vektek is here to assist in any way to see that your move to Power Workholding is easy, effective and profitable.

Learn the basic descriptions of Vektek workholding components.

PAGE 2

Types of Vektek POWER Supplies for POWER Workholding.

PAGE 4

What is a Palletized Fixture?

PAGE 5

Chart overview of Vektek Hydraulic Products

PAGE 6

Selecting the BEST Medium Capacity Pump configuration

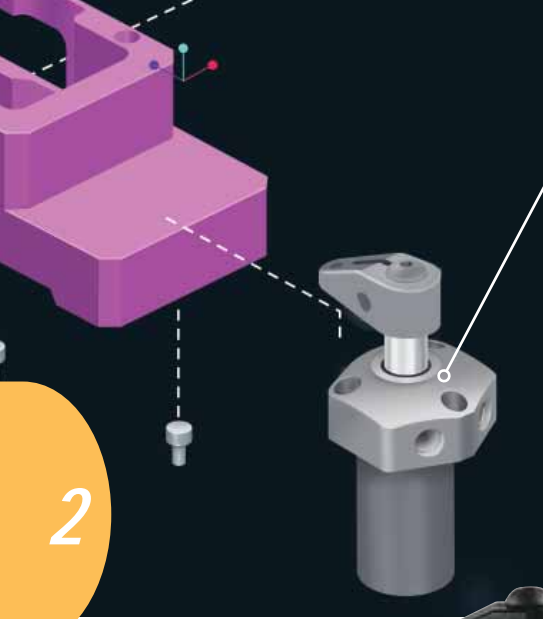
PAGE 8

What Vektek has to offer.

PAGE 9

Basic steps to PLAN YOUR Power Workholding System.

PAGE 10



2

SWING CLAMP

Swing clamps are some of the most used workholding devices. As the plunger retracts, the arm swings over the workpiece and pulls down to hold the part in place. As the plunger extends, the arm swings back out of the way to allow easy unloading of the workpiece.

Vektek swing clamps are available in these body and mounting styles:

SIZE

Vektek swing clamps come in a variety of sizes and cylinder capacities, from 2,0 kN to 33,0 kN.

MANIFOLD MOUNT

Vektek top flange and bottom flange swing clamps can be manifold mounted to eliminate external plumbing.



Top Flange

Threaded Body

Bottom Flange

Threaded Long Stroke

Low Profile Bottom Flange

Low Profile Threaded Body

Low Profile Top Flange

Team



The Productivity Devices Company

CALL OUR CUSTOMER SUPPORT TEAM TODAY TO DISCUSS HOW TO PUT VEKTEK PRODUCTS TO WORK FOR YOU!

Factory Direct:

+1-913-365-1045

China: +86-21-58683679

India: +91-40-27844279

Vektek STANDARD Swing Clamps come with a built-in extra cam. Giving you the option to use as a left swing, right swing or straight pull down clamp. Specify the movement you want when ordering and they will come preset.

SINGLE OR DOUBLE ACTING

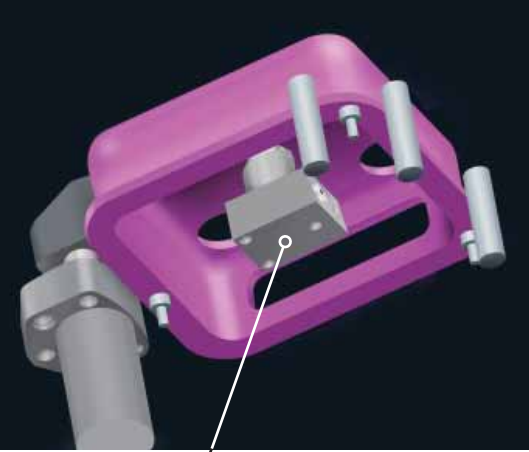
Swing clamps are either single or double acting. Single acting clamps use hydraulic pressure to retract the plunger/arm and a spring extends it. Double acting devices use hydraulic pressure to retract and to extend the plunger/arm.

ARM SWING

Swing clamps normally swing 90 degrees. Vektek has swing restrictors available which can limit this swing to a desired degree.

CLOCKING

Arm clocking is a feature that is available on most Vektek swing clamps. Clocking is a drill point on each clamp that standardizes arm location at a particular position. Arm clocking, if implemented, reduces the time it takes for design setup and later maintenance or replacement of the arm. It also provides easier alignment for custom made arms.



WORK SUPPORT

The basics of 3-2-1 fixturing require three points to define a plane of part location. When machining, a part often requires additional support in the "Z" plane. A floating support, or work support, is an easy solution. You can use a work support anywhere a "jack screw" can be used. A work support will position faster, without distortion of the part and without dependence on operator's "feel".

In applications where part distortion, chatter, ringing or poor surface finish are a result of part movement, a work support can decrease the problem, if not eliminate it.

Vektek work supports are available in spring advance, air advance, and fluid advance.

- **SPRING ADVANCE**

Available in four capacities from 4,4 kN to 55,6 kN. Applications include fragile parts, heavy parts, or "hog out" work. Spring extended plungers maintain contact with the part during loading exerting only spring force against the part. As hydraulic pressure is applied, the plunger "freezes" and does not exert any additional force on the part.

- **AIR ADVANCE**

Available in four capacities from 4,4 kN to 55,6 kN. Applications include fragile parts, heavy parts, or "hog out" work.

A continuous flow of air can serve as an "air spring" and can be left connected during machining. This "air curtain" can help keep harsh contaminants from getting between the plunger and sleeve. This is an excellent support choice for harsh environment applications.

- **FLUID ADVANCE**

Available in three capacities; 4,4 kN, 11 kN, and 17 kN. An internal piston in a fluid advance work support compresses a spring which in turn lifts the plunger to contact the workpiece. Hydraulic pressure automatically sequences, "freezing" the plunger properly against the workpiece surface. This is accomplished with a single hydraulic line.



LINK CLAMPS

Link clamps contain the beam mechanism preferred by some users. The link clamp lever accommodates hard-to-reach or hard-to-hit clamping points. This self-contained beam eliminates the need to build or design a clamp mechanism as part of the fixture. Vektek's unique single piece body and pivot design on the high pressure model provides the least side-to-side axial deflection and the most rigid product on the market today.

- **HIGH PRESSURE**

Available in four sizes from 1,5 kN to 22 kN capacities at 350 bar (35 MPa). Single and double acting. Designed to use as top flange or threaded body mount.

- **LOW PRESSURE**

Double acting only. Available in 2,5 kN, 5 kN and 10 kN capacities at 70 bar (7 MPa). Adjustable to left, forward, or right lever position from the same body. Top flange mount.

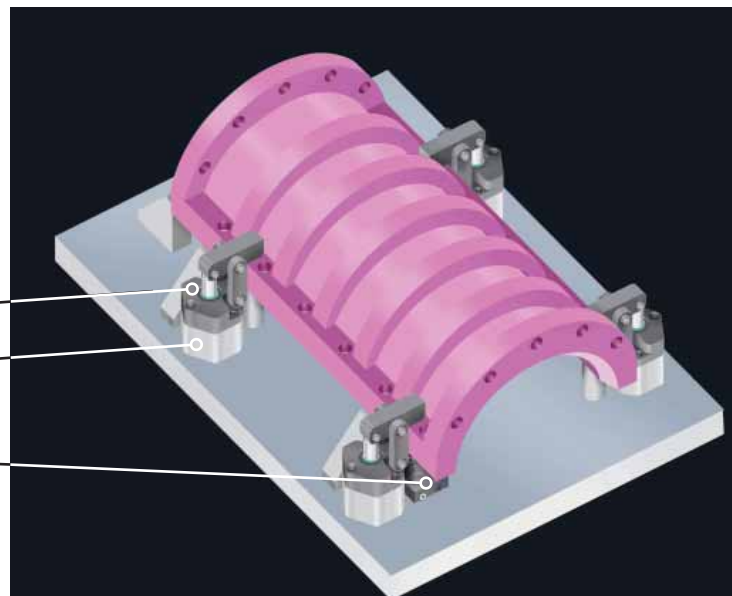


"When choosing a work support you should consider both the clamping force that holds the part against the work support and the forces created by the machine cutting into the part."

LINK CLAMP

SPACER

WORK SUPPORT





CYLINDERS

Most clamping cylinders are intended for pushing against a part and holding it in place. They are not intended to move a load as in power cylinder applications where punching, bending or forming are performed.

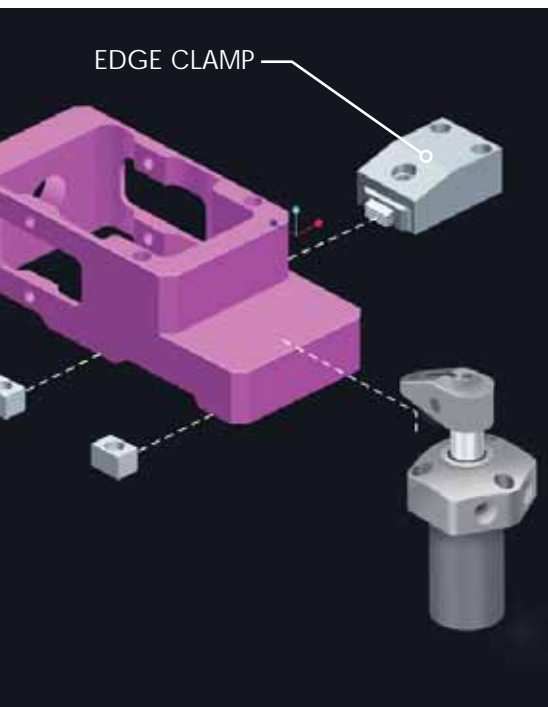
Cylinders are the least costly form of hydraulic clamping available. It is recommended that cutter forces be transmitted into fixed stops. They can be sized adequately to allow clamping across or against cutter forces.



SPECIAL CLAMPS

- Edge Clamp

Downward clamping angle of the blade yields both horizontal and vertical force pushing your part firmly against locators and the work surface. Low profile allows slab milling over the clamp on most parts.

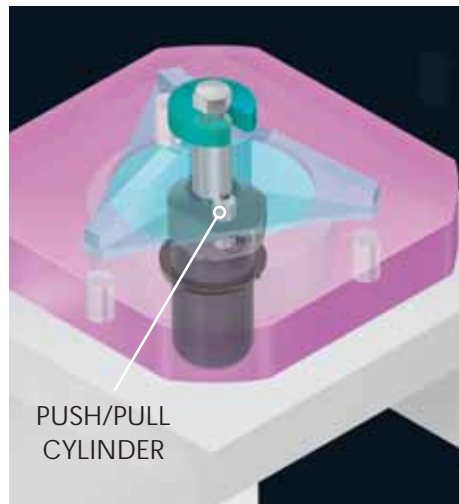


- Pull-Down Clamps, Concentric and Eccentric

With Vektek's Pull-Down Clamp, 5-sided machining can be carried out safely without clamp interference. Clamping sleeves are segmented and serrated to form and grip the clamping hole. These Pull-Down Clamps also serve as a support surface and "Z" locator for the workpiece.

- Pull-Down Clamps, Spring Return, Manifold Mounted and Double Acting

Use whenever edge face clamping is desired. Generates straight clamping motion and force along with pull-down clamping force to hold and pull down parts. There are three types of jaws available for different applications.



PUSH/PULL CYLINDERS

Push/Pull Cylinders are used to actuate a remote mechanism, pulling on clamp plates, or often used with a removable "C" washer as manually loaded then hydraulically activated.

Available in threaded and block body styles.

Medium Capacity Electric/Hydraulic Pump



POWER SUPPLIES

Vektek offers a variety of preconfigured power supplies that have been designed to provide optimum functionality for most power clamping applications, as a complete package.

- ELECTRIC / HYDRAULIC

Electric power supplies consist of a pump that is driven by an electric motor to create flow. The pump motor is controlled by a pressure switch, which will close when a preset pressure has been reached and shut the pump off. If pressure should fall below the reset point of the pressure switch, the pump motor will kick on and replenish the system's pressure.

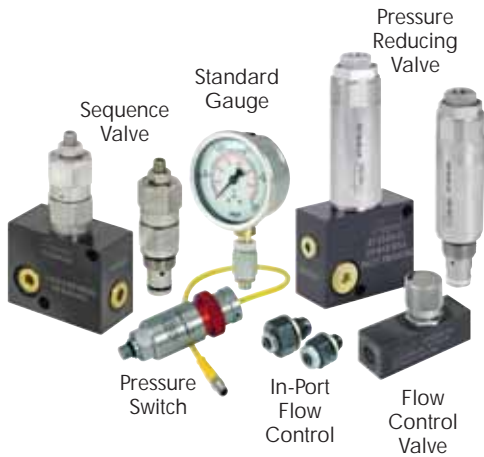
- AIR / HYDRAULIC BOOSTERS

Air/hydraulic boosters multiplies your shop air line pressure to power simple hydraulic systems.

- MANUAL SCREW PUMP

An inexpensive manually operated power supply for small systems. Can be driven by a "nut runner" for fast and precise actuation. Maximum working pressure of 350 bar (35 MPa) and a oil capacity of 26 cm³.

Please refer to the Vektek product catalog or website for specific details about power supplies.



ACCESSORY VALVES

Vektek accessory valve designs are specifically intended for use in hydraulic clamping systems. Vektek valves prevent system damage and erratic operation frequently experienced through the use of valves designed for general industrial applications. Steel components, hardened operating parts and flow rates are matched to the demands of workholding.

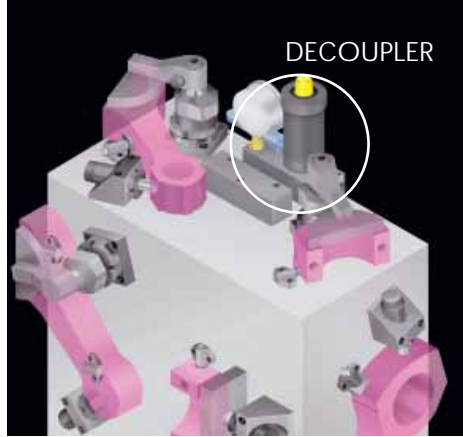


DIRECTIONAL CONTROL VALVES

A directional control valve is the extend or retract control for your hydraulic cylinders. It provides a flow path from the pump to the cylinders and a return path from the cylinders to the fluid reservoir.

Vektek Directional Control Valves are rated at 350 bar (35 MPa) working pressure.

Standardized mounting patterns mean that valve operation can easily be upgraded from manual to electric as Vektek electric solenoid valves are direct bolt-on replacements for the manually operated versions without having to change system plumbing.



Manual Shutoff Decoupler with accumulator and gauge Automatic Shutoff Decoupler with accumulator



PALLETIZED FIXTURES

A palletized fixture is a workholding mechanism that can separate from the hydraulic power source and still maintain hydraulic pressure. This is achieved with a pallet decoupler. A pallet decoupler serves as the interface between the stationary pump and the moving pallet, and is the point where the hydraulic hoses from the pump are connected and disconnected. The decoupler stays on the pallet and is the source of pressurized hydraulic fluid for the clamping circuit while it is disconnected from the pump.

A decoupler must contain a shutoff valve to trap pressurized fluid from the pump within the clamping circuit. It must also contain a quick disconnect for connecting the hoses, filter screens to minimize the amount of contamination that enters the pallet hydraulic circuit and an accumulator to store pressurized hydraulic fluid to help maintain pressure to the clamping circuit while the pallet is in the machine.

There are two basic types of decouplers: Automatic or Manual.

In Manual Shutoff Valve Decouplers, the operator manually closes and opens the shutoff valve. Most Manual Shutoff Valve Decouplers are used with single acting clamp systems, but some can be configured for double acting use.

An Automatic Shutoff Valve Decoupler is actuated by Clamp and Unclamp pressure from the power supply. This leaves the operator to connect hoses and control only the pump, not the valves. Automatic Decouplers are used with both single and double acting circuits with equal ease.



PALLET PRESSURE MONITOR SYSTEM

The Guardian™ is a wireless pallet pressure monitoring system that provides continuous pressure monitoring during a machining cycle. Used with a hydraulic pressure switch to indicate pressure loss below the set-point of the switch. The Guardian™ will immediately signal the machine to execute a user defined shutdown mode should pressure loss occur.

The Guardian™ receiver identifies offending pallets using an internal self-diagnosing flashing light indicator. It not only confirms pressure, but also:

- Communicates faults to the machine controller to initiate shutdown procedures if necessary.
- Diagnoses its own link disconnects
- Stores all settings in a nonvolatile memory. This prevents time spent reprogramming in the event of a power outage.
- Advises of low-battery condition

One receiver is capable of monitoring up to 128 transmitters within a 36+ meters range. A single transmitter can be paired to and monitored by different Guardian™ receivers from different locations. This allows machine transfer lines to monitor a single fixture within its individual machining cycle as it travels from one machine to the next.

The receiver, when given input from the machine controller, will only communicate with one transmitter during the machining cycle.

Vektek offers a complete line of Hydraulic devices in metric and inch sizes.

To receive a complete product catalog call...

Factory Direct:
+ 1-913-365-1045
China:
+ 86-21-58683679
India:
+ 91-40-27844279

Or, e-mail your contact information, including mailing address to:
sales@vektek.com

WORK SUPPORTS

SPRING ADVANCE		AIR ADVANCE		FLUID ADVANCE			
4,4 kN	41-0051-07	41-0050-07	41-0061-07	41-0060-07	41-0071-04	41-0070-04	40-9872-40
11,0 kN	41-0051-06	41-0050-06	41-0061-06	41-0060-06	41-0071-03	41-0070-03	40-9872-43
33,4 kN		41-0050-04		41-0060-04	41-0071-05	41-0070-05	40-9872-47
55,6 kN		41-0050-05		41-0060-05			

SWING CLAMPS

SINGLE ACTING

2,0 kN	41-5002-12 Left	41-5002-11 Right	41-5602-12 Left	41-5602-11 Right	41-5202-12 Left	41-5202-11 Right
4,9 kN	41-5005-12 Left	41-5005-11 Right	41-5605-12 Left	41-5605-11 Right	41-5205-12 Left	41-5205-11 Right
11,6 kN	41-5011-12 Left	41-5011-11 Right	41-5611-12 Left	41-5611-11 Right	41-5211-12 Left	41-5211-11 Right
22,0 kN	41-5022-12 Left	41-5022-11 Right				

DOUBLE ACTING

2,0 kN	41-5002-22 Left	41-5002-21 Right	41-5005-24 Left	41-5005-23 Right	41-5602-22 Left	41-5602-21 Right	41-5202-22 Left	41-5202-21 Right
4,9 kN	41-5005-22 Left	41-5005-21 Right	41-5011-24 Left	41-5011-23 Right	41-5605-22 Left	41-5605-21 Right	41-5205-22 Left	41-5205-21 Right
11,6 kN	41-5011-22 Left	41-5011-21 Right	41-5011-24 Left	41-5011-23 Right	41-5611-22 Left	41-5611-21 Right	41-5211-22 Left	41-5211-21 Right
22,0 kN	41-5022-22 Left	41-5022-21 Right						

LOW PROFILE - HIGH CAPACITY SWING CLAMPS

22 kN	41-5022-13 RIGHT	41-5622-11 RIGHT	41-5622-23 RIGHT	41-5222-11 RIGHT
	41-5022-14 LEFT	41-5622-12 LEFT	41-5622-24 LEFT	41-5222-12 LEFT
	41-5022-10 STRAIGHT	41-5622-10 STRAIGHT		41-5222-10 STRAIGHT
33 kN	41-5033-11 RIGHT	41-5633-11 RIGHT	41-5633-23 RIGHT	41-5233-11 RIGHT
	41-5033-12 LEFT	41-5633-12 LEFT	41-5633-24 LEFT	41-5233-12 LEFT
	41-5033-10 STRAIGHT	41-5633-10 STRAIGHT		41-5233-10 STRAIGHT
22 kN	41-5022-23 RIGHT	41-5622-21 RIGHT		41-5222-21 RIGHT
	41-5022-24 LEFT	41-5622-22 LEFT		41-5222-22 LEFT
	41-5022-20 STRAIGHT	41-5622-20 STRAIGHT		41-5222-20 STRAIGHT
33 kN	41-5033-21 RIGHT	41-5633-21 RIGHT		41-5233-21 RIGHT
	41-5033-22 LEFT	41-5633-22 LEFT		41-5233-22 LEFT
	41-5033-20 STRAIGHT	41-5633-20 STRAIGHT		41-5233-20 STRAIGHT

PUSH/PULL CYLINDERS

SINGLE ACTING	2,1 kN	42-5010-51	5,9 kN	42-5111-01
	6,2 kN	42-5010-91		42-5111-02
	13,7 kN	42-5011-31		42-5111-51
24,9 kN	42-5018-00	42-5111-52		

DOUBLE ACTING

2,1 kN	42-5020-51
6,2 kN	42-5020-91
13,7 kN	42-5021-31
24,9 kN	42-5028-00

HARDWARE

44-0220-00	44-0228-00	44-0128-00	44-0020-00
	44-0235-00	44-0132-00	44-0026-00
	44-0238-00	44-0135-00	44-0028-00
	44-0248-00	44-0138-00	44-0035-00
	44-0265-00	44-0148-00	44-0038-00
		44-0165-00	44-0048-00
		44-0180-00	44-0065-00
			44-0080-00

SWING CLAMP ARMS

2,0 kN	44-1011-00	44-1411-00	44-1111-00	44-1211-00	44-5205-08	44-5205-09	44-5205-10
4,9 kN	44-1015-00	44-1415-00	44-1115-00	44-1215-00	44-5209-08	44-5209-09	44-5209-10
11,5 kN	44-1022-00	44-1422-00	44-1122-00	44-1222-00	44-5213-08	44-5213-09	44-5213-10
22,0 kN	44-1022-00	44-1431-01	44-1131-01	44-1231-01			
ARMS FOR LOW PROFILE SWING CLAMPS							
	44-1032-00	44-1431-00	44-1131-00	44-1231-00			
33kN	44-1032-00	44-1432-00	44-1132-00	44-1232-00			

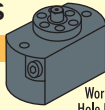
LINK CLAMPS AND LEVERS

SINGLE ACTING	1,5 kN	91-6610-40	91-6004-03	91-6004-03	91-6004-04	91-6004-05
	3,0 kN	41-6610-60	91-6006-03	91-6006-03	91-6006-04	91-6006-05
	6,0 kN	41-6610-90	91-6009-03	91-6009-03	91-6009-04	91-6009-05
	13,0 kN	41-6611-40	91-6014-03	91-6014-03	91-6014-04	91-6014-05
	DOUBLE ACTING					
1,5 kN	41-6620-40	91-6004-02	91-6004-02	91-6004-04	91-6004-05	
3,0 kN	41-6620-60	91-6006-02	91-6006-02	91-6006-04	91-6006-05	
6,0 kN	41-6620-90	91-6009-02	91-6009-02	91-6009-04	91-6009-05	
13,0 kN	41-6621-40	91-6014-02	91-6014-02	91-6014-04	91-6014-05	

LOW PRESSURE LINK CLAMPS AND LEVERS

DOUBLE ACTING ONLY	2,5 kN	41-6621-10 FORWARD	91-6011-01	91-6011-02	91-6011-04	91-6011-05
		41-6621-11 RIGHT				
		41-6621-12 LEFT				
5,0 kN	41-6621-50 FORWARD	91-6015-01	91-6015-02	91-6015-04	91-6015-05	
	41-6621-51 RIGHT					
	41-6621-52 LEFT					
10,0 kN	41-6622-10 FORWARD	91-6021-01	91-6021-02	91-6021-04	91-6021-05	
	41-6622-11 RIGHT					
	41-6622-12 LEFT					

SPECIAL USE CLAMPS



Work Piece
Hole Diameter

41-5310-01 (STANDARD)
41-5310-00 (MFLD)

4,0 kN	41-5711-09	8,8-9,7
	41-5711-10	9,8-10,7
	41-5711-11	10,8-11,9
10 kN	41-5711-12	12,0-12,9
	41-5711-13	13,0-13,9
	41-5711-14	14,0-14,9
	41-5711-15	15,0-15,9
26 kN	41-5711-16	16,0-16,9
	41-5711-17	17,0-17,9
	41-5711-18	18,0-18,9
	41-5711-19	19,0-19,9
31 kN	41-5711-20	20,0-20,9
	41-5711-21	21,0-21,9
	41-5711-22	22,0-22,9
	41-5711-23	23,0-23,9
	41-5711-24	24,0-24,9
	41-5711-25	25,0-25,9

SINGLE ACTING

4,5 kN	41-5310-05	39-0510-43	41-5305-01	41-5305-02	41-5305-03
20,0 kN	41-5310-20	39-0510-44	41-5320-01	41-5320-02	41-5320-03
32,0 kN	41-5310-32	39-0510-44	41-5332-01	41-5332-02	41-5332-03
50,0 kN	41-5310-50	39-0510-44	41-5350-01	41-5350-02	41-5350-03

DOUBLE ACTING

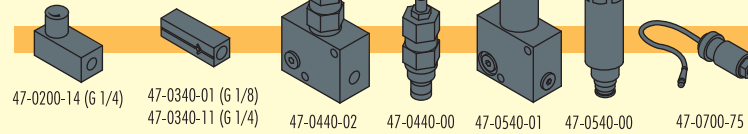
20,0 kN	41-5320-20	39-0510-44	41-5320-01	41-5320-02	41-5320-03
---------	------------	------------	------------	------------	------------



The Productivity Devices Company

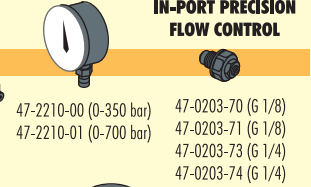
Download a PDF catalog at:
www.vektek.com

ACCESSORY VALVES



47-0200-14 (G 1/4) 47-0340-11 (G 1/8) 47-0440-02 47-0440-00 47-0540-01 47-0540-00 47-0700-75

IN-PORT PRECISION FLOW CONTROL



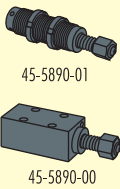
47-2210-00 (0-350 bar) 47-0203-70 (G 1/8)
47-2210-01 (0-700 bar) 47-0203-71 (G 1/8)
47-0203-73 (G 1/4)
47-0203-74 (G 1/4)

CYLINDERS (STROKE MEASUREMENT)

kN	SINGLE ACTING		DOUBLE ACTING		SINGLE ACTING		DOUBLE ACTING	
	Stroke (mm)	Part No.	Stroke (mm)	Part No.	Stroke (mm)	Part No.	Stroke (mm)	Part No.
2,4	9,5	42-1010-00	5,0	42-1010-01	6,5	42-0010-00	6,5	42-0120-00
4,4	19,0	42-0010-10	7,0	42-1010-01	19,0	42-0010-01	19,0	42-0120-01
	32,0	42-0010-11						
	6,5	42-0010-02	9,5	42-1010-02	12,5	42-0010-03	12,7	42-1110-02
10,1	19,0	42-0010-12	19,0	42-1010-03	25,5	42-0010-04	25,5	42-1110-03
	32,0	42-0010-13						
	8,0	42-1010-04	25,5	42-0020-00	38,1	42-0110-12	38,1	42-0120-08
17,8			51,0	42-0020-01	51,0	42-0110-04	51,0	42-0120-04
			12,5	42-0010-06	12,5	42-0110-05	12,7	42-1110-05
			25,5	42-0010-07	25,5	42-0110-06	25,4	42-1110-06
			39,9	42-0020-03	39,9	42-0110-13	38,1	42-1110-09
39,9			51,0	42-0110-14	51,0	42-0120-07	50,8	42-1120-07

POWER SUPPLIES

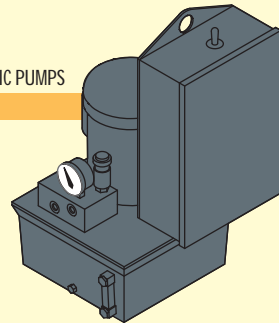
SCREW PUMPS



45-5890-01
45-5890-00

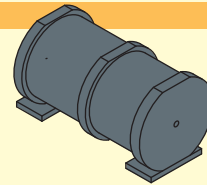
ELECTRIC / HYDRAULIC PUMPS

(MANIFOLD ONLY SHOWN)
230 VAC 3 PH
55-9242-63
380 VAC 3 PH
55-9272-63
440 VAC 3 PH
55-9292-63



SEE CATALOG FOR COMPLETE
POWER SUPPLY LISTING

AIR / HYDRAULIC BOOSTERS



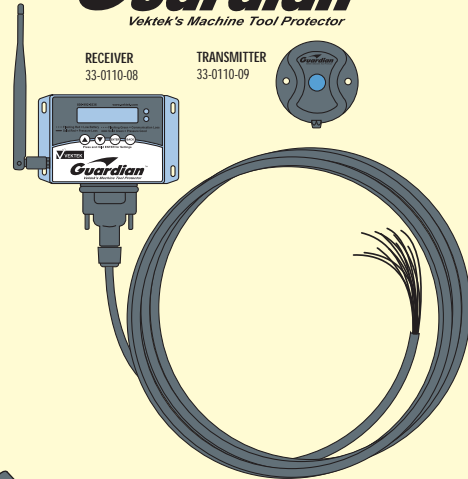
CONTROL -	W/O	MANUAL	24 VDC
11:1	45-5000-00	45-5000-01	45-5000-02
22:1	45-5000-03	45-5000-04	45-5000-05
40:1	45-5000-06	45-5000-07	45-5000-08
54:1	45-5000-09	45-5000-10	45-5000-11

PALLET PRESSURE MONITOR SYSTEM

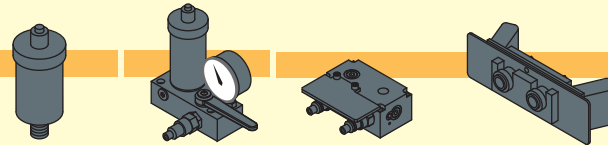


RECEIVER
33-0110-08

TRANSMITTER
33-0110-09

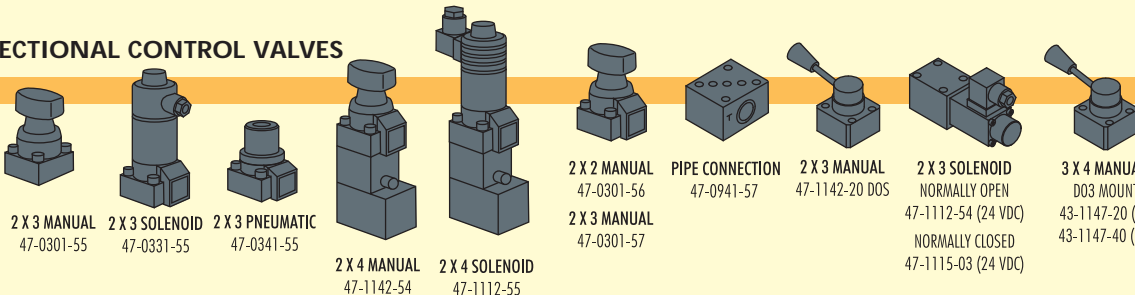


PALLETIZED FIXTURE ACCESSORIES



140 bar (14MPa) - 350 bar (25 MPa) CIRCUIT	49-0116-01 53 cm ³	45-6001-01	45-6007-03	45-6005-04
70 bar (7 MPa) - 250 bar (25 MPa) CIRCUIT	49-0116-02 59 cm ³	45-6001-02		

DIRECTIONAL CONTROL VALVES



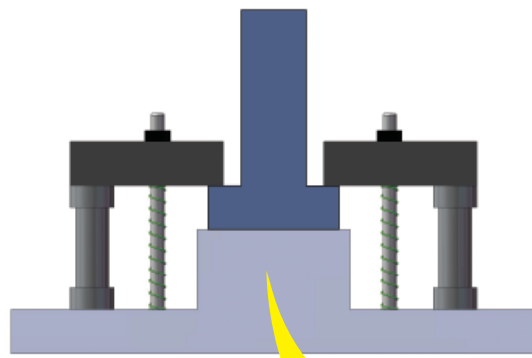
2 X 3 MANUAL 47-0301-55 2 X 3 SOLENOID 47-0331-55 2 X 3 PNEUMATIC 47-0341-55
2 X 4 MANUAL 47-1142-54 2 X 4 SOLENOID 47-1112-55
2 X 2 MANUAL 47-0301-56 PIPE CONNECTION 47-0941-57 2 X 3 MANUAL 47-1142-20 DOS
2 X 3 MANUAL 47-0301-57 2 X 3 SOLENOID NORMALLY OPEN 47-1112-54 (24 VDC)
2 X 3 SOLENOID NORMALLY CLOSED 47-1115-03 (24 VDC)
3 X 4 MANUAL D03 MOUNT 43-1147-20 (CC)
43-1147-40 (PB)

TRANSFORMING A MANUAL STRAP CLAMP FIXTURE INTO A HYDRAULIC POWER FIXTURE

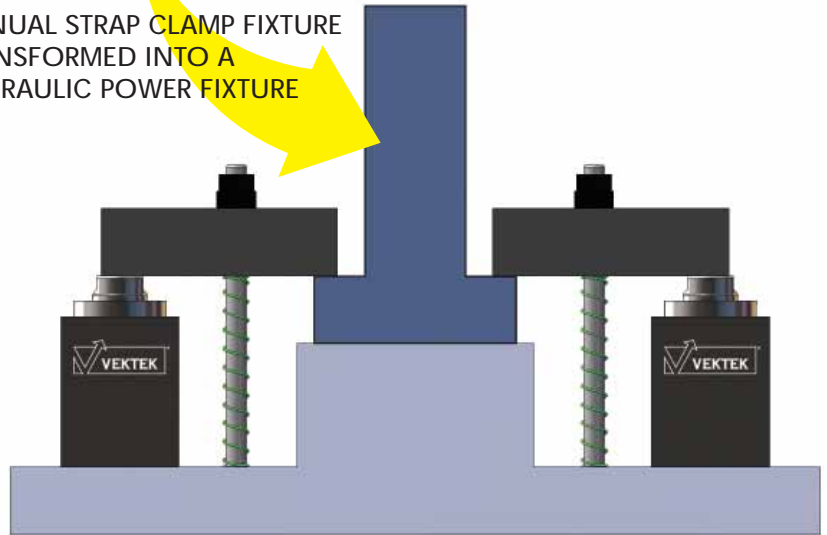
Let's take a common manual strap clamp fixture found in most any machine shop, similar to the one illustrated above right, and convert it to a Hydraulic Power Fixture.

As you can see in the lower illustration at right, the heels have been replaced with Vektex Block Cylinders. The studs have been double nutted to a desired location. Now, all that is required is connecting the plumbing and power source to the block cylinders.

Air/hydraulic boosters are an inexpensive way to power single acting systems.



MANUAL STRAP CLAMP FIXTURE TRANSFORMED INTO A HYDRAULIC POWER FIXTURE



SELECT your hourly labor rate and number of clamps on the fixture. The chart below shows the savings per cycle and the number of cycles to payback to go power. PLUS the continual SAVINGS per cycle.

DOLLAR SAVINGS POTENTIAL PER CLAMP CYCLE

SAVINGS FORMULA <i>See TIME SAVINGS chart, below right.</i>	LABOR RATE	2 CLAMPS	4 CLAMPS	8 CLAMPS	12 CLAMPS
		1 PART	1 PART	2 PARTS	3 PARTS
EXAMPLE OF FIXTURE SHOWN: 2 CLAMPS/1 PART @ \$50 hr. labor	\$50 per hour	\$0.28	\$0.67	\$1.44	\$2.19
	Payback Cycles	5,953	3,560	2,653	2,400
Hourly Rate (\$50) divided by number of seconds per hour (3600) = rate per second (\$0.0139) X seconds saved (20) = DOLLARS SAVED PER CLAMP CYCLE 0.278 cents (\$.28)	\$25 per hour	\$0.14	\$0.335	\$0.72	\$1.095
	Payback Cycles	11,906	7,120	5,306	4,800
	\$12.50 per hour	\$0.07	\$0.17	\$0.36	\$0.55
	Payback Cycles	23812	14,240	10,612	9,600

$$\frac{\text{APPROX. COST TO ADD HYDRAULIC POWER TO STRAP CLAMP FIXTURE}}{\text{DOLLARS SAVED PER CLAMP CYCLE}} = \text{NUMBER OF CYCLES}$$

$\frac{\$1667.}{\$0.28} = 5953$

• PLUS •
Savings of \$.28 with every clamp cycle made after payback.

TIME SAVINGS:

2 CLAMPS / 1 PART
MANUAL CLAMPING TIME 35 SECONDS
POWER CLAMPING TIME 15 SECONDS
SAVINGS OF 20 SECONDS

4 CLAMPS / 1 PART
MANUAL CLAMPING TIME 68 SECONDS
POWER CLAMPING TIME 20 SECONDS
SAVINGS OF 48 SECONDS

8 CLAMPS / 2 PARTS
MANUAL CLAMPING TIME 130 SECONDS
POWER CLAMPING TIME 26 SECONDS
SAVINGS OF 104 SECONDS

12 CLAMPS / 3 PARTS
MANUAL CLAMPING TIME 192 SECONDS
POWER CLAMPING TIME 34 SECONDS
SAVINGS OF 158 SECONDS

Calculations based on:

MANUAL - Time to load part, position clamps, tighten clamp nuts with a break-over torque wrench, loosen clamps and unload part.

POWER - Time to load part, position clamps, activate hydraulic power source, build to pressure, release pressure and unload part.

PAYBACK CYCLES - Based on system cost including number of powered clamping cylinders, Air/Hydraulic Booster, Hoses, Fittings and allowing \$15 per clamp for tool modification and for installation. *Actual may vary.*



This photo shows the parts required to power and plumb the fixture illustrated.

TYPICAL STEPS TO POWER WORKHOLDING

After several conversations with a Vektek sales representative, you may uncover an application where hydraulic clamping will pay for itself in a very short time. The next step would be to call and discuss your fixturing concept with one of our Application Engineers.

They may ask you to send information about your current fixture, part(s), machine and processes for them to study and propose a clamping concept. So you know what to expect, we do not "design" the fixture, we provide a concept. With the concept we can provide a Bill of Materials, if you request one.

To aid in your fixture design, CAD files for each product are available online at www.vektek.com or by requesting a CD from your sales representative.

After your design is complete, call us to place your order. We will deliver your components promptly.

The relationship does not end here. We want your fixture to work right and keep on working.

Please read the following **PRODUCT OVERVIEW** and **SERVICES** to help understand Vektek's commitment to customers.

QUALITY VEKTEK PRODUCTS

Vektek products are not just another "me too" product. Vektek does exhaustive research, design, development and testing to insure our products set the workholding standard for the rest to follow.

Vektek has developed BHC™, a special black hard coating, to make device bodies extra durable. This high tech surface hardening process virtually eliminates the bore scoring and scratching that is the most common reason for seal failures and leakage in some brands.

Extensive use of Hard Chrome components are incorporated to provide improved load bearing surfaces where it is critical to device life. Special seals and wipers prevent leaks and keep contaminants out.

Warranty is an indication of a manufacturer's confidence in the ability of the product to run "trouble-free" for a specified time. Our hydraulic products are warranted for one year from date of shipment.

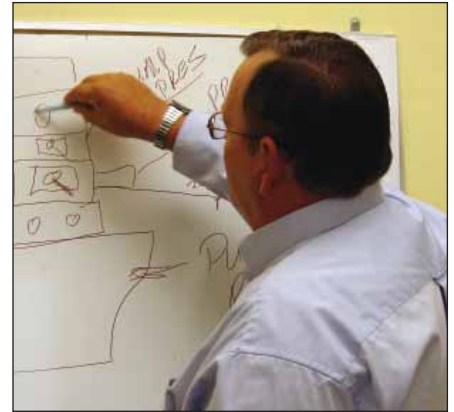
Please compare the durability and long life of our devices with that of our competitors. Prove it to yourself. We welcome any head-to-head run-off.

PRODUCT AVAILABILITY

We do our best to have products in stock. Barring unforeseen large orders, we keep adequate shelf stock to be ready to ship small orders quickly. We can normally ship next day or same day if necessary to help you out.

QUALITY VEKTEK SERVICES

- A trained sales staff to assist you
- Technical advice and support
- Fixture Concepting at no charge
- Technically trained representatives



- On-site Training - By appointment, we will come to your location for workholding training.
- Prompt price quotes
- Order follow-up...we make sure you received your order promptly and have what you need!
- We stay connected.

WEBSITE: www.vektek.com

- PDF catalog
- CAD 2 D & 3D drawing downloads
- Parts List download
- Site Search
- Partners - National and International

REPAIR AND MAINTENANCE SERVICE

At times repairs are required, our repair team is ready to service and return to you promptly.

For those who do not wish to perform maintenance to their devices on their own, Vektek offers a maintenance service. Contact Vektek for details and scheduling.

Team



The Productivity Devices Company

1334 E 6th Avenue
Emporia, KS 66801 USA

Factory Direct: +1-913-365-1045 • China: +86-21-58683679 • India: +91-40-27844279

sales@vektek.com
www.vektek.com

Planning Your Power Workholding System.

Successful powered workholding does not just happen. Like any other manufacturing process, it must be carefully planned. But that does not mean that you need to be a hydraulics engineer to implement a powered workholding system.

Designing a system involves a common-sense application of a few basic workholding concepts.

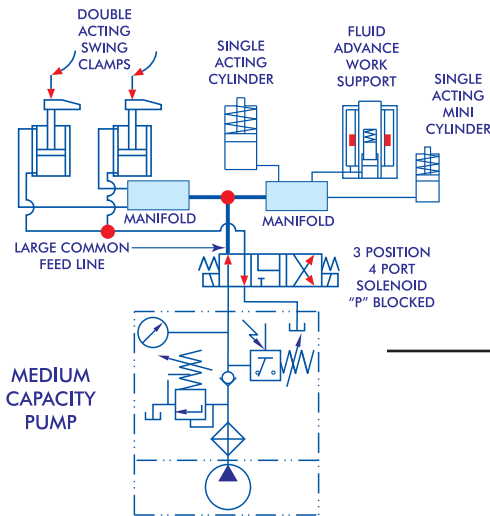
Applications for power workholding fall into two categories:

- **Retrofits**
Replacing and upgrading clamps on existing fixtures.
- **New Fixture**
Designed from the beginning with power workholding.

In both cases you must keep in mind the forces that can be generated by hydraulic power workholding devices. A single device that you can hold in your hand can generate five tons of clamping force.

In replacing existing manual bolt & nut clamping or toggle clamps it is imperative the fixture or machine tool base will withstand the forces. Do not risk damaging a machine bed by tying a 30kN clamp into a T-slot that can only withstand 15 kN of force.

Power workholding and manual workholding use the same principles of sound fixture design. Using the 3-2-1 concept as it relates to the location of the workpiece in three planes is the same for both. Workholding devices should be positioned to ensure firm contact between the workpiece and locating buttons/pins or surface.



Begin the planning process by asking yourself the following:

- What do you want your system to accomplish?
- What sort of operation is going to use the system?
- What clamping "speed" is appropriate for the speed at which your production line runs?

You should select "realistic" cycle times...the shorter the cycle time, the larger the power source required. *Example:* A pump with 1/3 hp electric motor may reach clamping pressure on a given system in three seconds. To accomplish the same task in one second it would require a 1 hp electric motor - a considerable increase in initial expense and operating costs.

Double acting devices will assure full cylinder retraction on a timely basis even in systems where restrictions such as small orifices or long tubing runs have been introduced.

Step 1:

WHAT YOU MUST KNOW

Determine...

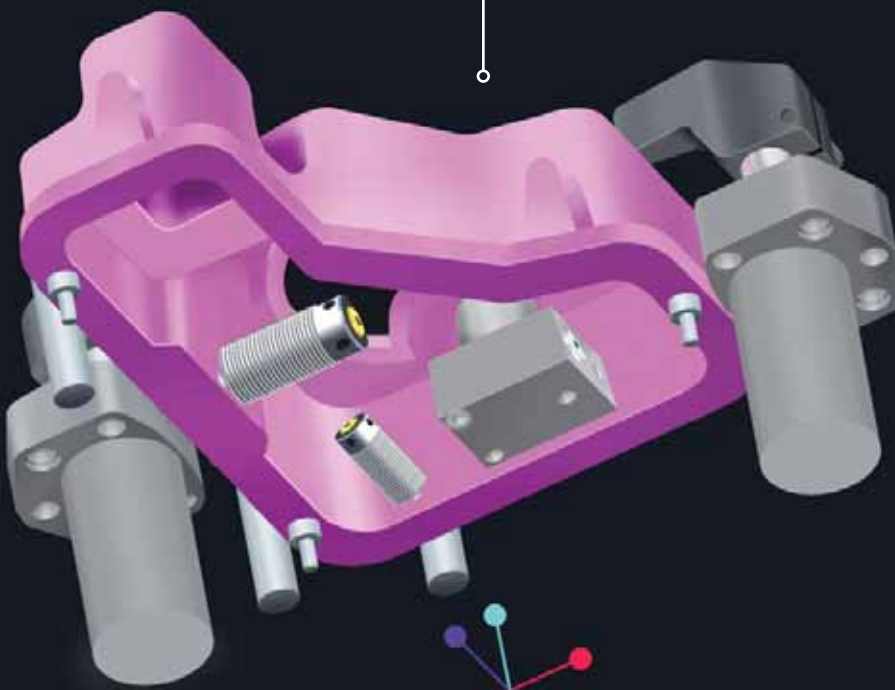
- ...the operation to be performed.
- ...the number of parts to be processed per cycle.
- ...if the operations are to be performed on more than one surface of each part.
- ...the time for part loading, unloading and clamping.

Consult your machine tool file to determine the work space on the machine table, bed, chuck or other surface. Be sure that the space will accommodate the part or quantity of parts to be processed according to your manufacturing work-flow. If not, revise your plan.

In this initial phase of system planning, include adequate measures and devices to ensure the safety of workers and equipment.

Step 2:

Prepare an outline of the sequence of events that will take place during the manufacturing cycle. This will assist you in determining the types of special sequencing valves you might need, as well as external control (such as a tie-in with machine controls) that your application may require.



Step 3:

Calculate the cutting forces generated in the machining process and note the direction the forces tend to act on the workpiece. If you are planning a retrofit of a manual clamping system, use the current torques. It is recommended that cutting forces be calculated, as a precaution in such a case, to ensure that workholding devices are sized to provide an adequate margin of safety. The operation manuals of many machine tools contain tables that list machining forces or simple formulas for calculating these forces. But if you can't find the information, give us a call, we will be glad to help.

Step 4:

Plan your fixture with positive fixed stops to resist the majority of cutting forces and to ensure correct location of the workpiece using the primary part locating features.

Step 5: (optional)

Normally you would calculate the forces required to overcome workpiece weight and friction and to move the part against the fixture stops. With Vekttek's two-stage design of power sources, this is an optional step. The low-pressure, high-flow first stage will generally move clamping devices into position around the workpiece and generate sufficient force to settle the workpiece against fixture stops before generating high pressure clamping forces.

Step 6:

After determining the machine cutting forces, calculate the clamping force required to hold the workpiece on the fixture or machine table for the materials you will be working with. Give us a call if you need help.

Step 7:

Determine the placement where the clamps should contact the part to hold it securely and to avoid interference with machine operations. If clamps cannot be located to avoid machine operations, it will be necessary to use an external control device to move the clamps out of the way as the need arises during the sequence. This will require that electrically actuated valves be used to control the offending devices separately.

Step 8:

Determine the type and number of workholding devices you need based on the total clamping force required and clamping positions you've selected.

Step 9:

DETERMINING SIZE OF POWER SOURCE

To determine the capacity of the power source you will need, add up the total oil displacement requirements for the devices you have selected. Then choose a power source with equal or greater capacity and determine if it will operate the system within your clamping time constraints by working out the following formulas:

$$(\text{Device(s) Oil Capacity}) \div (\text{Low Pressure Flow}) = \text{Position Time}$$

Low pressure pump oil volume is expressed in cubic centimeters/minute. Device Capacity is total device oil capacity expressed in cubic centimeters/minute (cm³). Position time is time to position expressed in decimal parts of a minute.

To the result obtained above, add the result of the following calculation to obtain total estimated clamping time.

$$[(\text{System Oil Capacity}) \div (\text{High Pressure Flow})] \times .01 (\text{System Operating Pressure} \div 70)$$

H.P. flow is high pressure pump oil volume expressed in cubic centimeters/minute. Sys. Cap. is total system oil capacity, the workholding device capacity plus the internal volume of any associated tubing, hoses, manifolds, etc. (For small systems, the plumbing volume may be so small as to be negligible. However, systems with long runs of tubing or hoses, their volume may materially affect the time it takes for operating pressure to be reached.)

The expression $.01 \times (\text{System Operating Pressure} \div 70)$ takes into account the slight compressibility of oil and system elasticity which influence the length of time required to pressurize a system. Pressurize time is the total time to reach pressure expressed in decimal parts of a minute.

If total estimated clamping time is not within the cycle time requirements you have targeted, but within device limitations, a larger power source is required - - one with greater capacity. Select such a source and repeat the above calculations to ensure it will provide the clamping cycle times required.

If the total estimated clamping time is significantly less than the time allowed, your initial power source selection may be too large. In such a case, select a smaller power source and repeat the above calculations to ensure it still provides the clamping cycle times desired.

Additional factors that should be considered when selecting a power source include the shop floor plan and /or machine layout and your preference for the type of power source - - shop air or electric.

Large electrical power sources may be used to supply several workholding systems, each operating independently at several machines. In this case, the timing and sequence of operations for each individual system must be calculated as shown above in order to arrive at a size for the power source.

Step 10:

Select valves and other control components to accomplish the sequence of operations you outlined in Step 2.

Step 11:

Select appropriate safety control mechanisms. All Vekttek electrical power modules have a hydraulic pressure switch as standard equipment to ensure consistent pressures are maintained. However, when a power source is used to power several separate systems, each system should also have its own pressure monitor.

Step 12:

Select the plumbing components required to connect the power source to the valves and devices. Review your system specifications and layout to determine what you need in terms of ratings, sizes and lengths.

Step 13:

Let us take a look. Our applications engineers do not design fixtures. Their job is to help you use hydraulic clamps successfully. Whether you are retrofitting existing fixtures, need a concept idea for clamping a new part or want a quick review of your design, we are here to help.





The Productivity Devices Company

1334 E. 6th Avenue
Emporia, KS 66801 USA

Machine Parts Better, Faster, and MORE Consistently

WITH POWER WORKHOLDING

- Achieve Greater Repeatability
- Use Higher Cutting Speeds
- Faster Clamping
- Produce Less Scrap

DETAILS INSIDE

