PCI

advancing air separation technology

ON-SITE OXYGEN SOLUTIONS

Industrial

Improve productivity, reduce operating costs, and benefit the environment

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INTRODUCTION TO PCI GASES AND VSA TECHNOLOGY

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Company Overview:

Pacific Consolidated Industries (PCI Gases) is a company based in Riverside, USA, that makes point-of-use air separation equipment that produce either nitrogen or oxygen. This equipment finds its use in markets such as Medical, Industrial, Oil & Gas, and Military. One of our key product lines is the DOCS (Deployable Oxygen Concentration System). This is used to make industrial and medical grade oxygen.

Unique VSA Technology:

We use a unique Vacuum Swing Adsorption (VSA) technology to generate oxygen that uses significantly less valves and rotating components than competing technologies. This in turn leads to inherently higher reliability, which is important in countries with under-developed or challenging infrastructures where oxygen supply is usually the most uncertain.

In addition, this unique technology leads to 50% less power consumption compared to its competitors. This results in very low operating costs and hence addresses another large problem for many countries, the high cost of oxygen for acute hospital care.

We've been manufacturing oxygen concentrators using this technology for over 10 years. During the period, we've built around 500 systems ranging from sizes of 4 m3/hr to 600 m3/hr. The units have found homes in 40+ countries across all continents in applications as diverse as civilian hospitals, mobile field hospitals, military medical use, high altitude oxygen enrichment, cylinder filling, water and wastewater treatment, aquaculture, pulp & paper, metal cutting, combustion, mining among others.

TECHNOLOGY PROFILE

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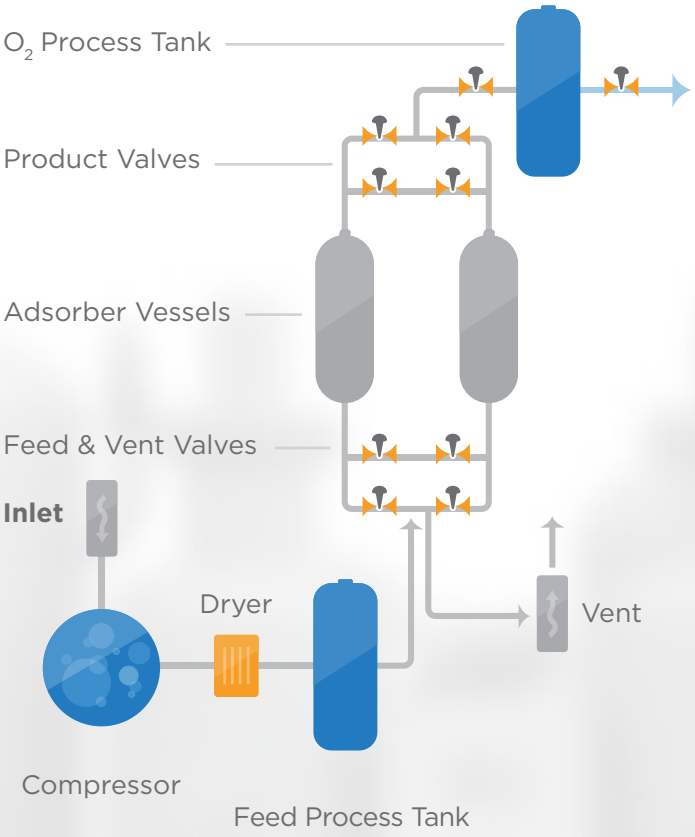
To produce oxygen from air, PCI uses a proprietary Vacuum Swing Adsorption (VSA) process that eliminates many of the design problems associated with traditional Pressure Swing Adsorption (PSA) systems.

Our innovative VSA system eliminates the need for process valves, feed air compressors, and associated dryers and feed air filtering systems.

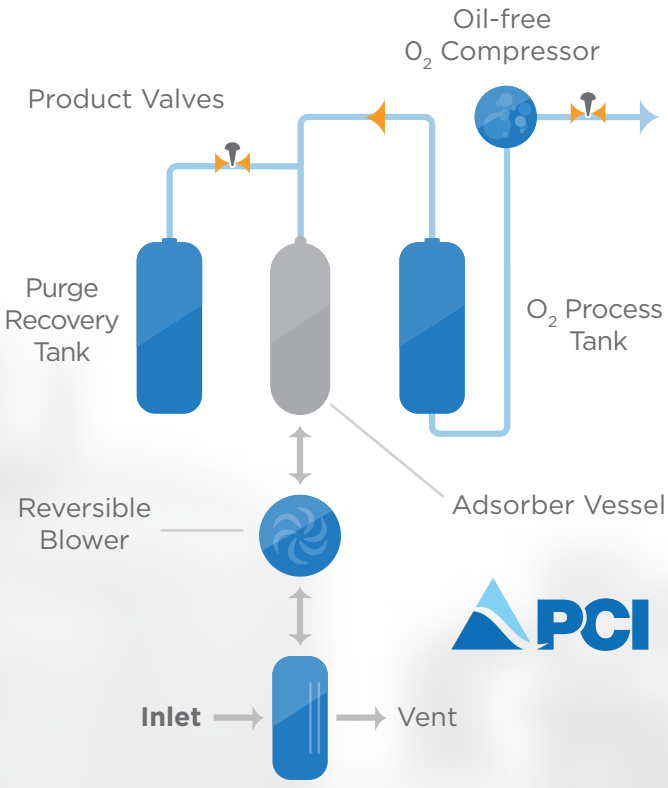
PCI's robust VSA process extracts maximum sieve and power efficiencies = low cost (both CapX and OpX) high purity oxygen generation.

VACUUM SWING ADSORPTION (VSA)
VS
PRESSURE SWING ADSORPTION (PSA)

COMPLEX **PSA** TECHNOLOGY



SIMPLY STATE-OF-THE-ART
VSA TECHNOLOGY BY PCI GASES



Keeping Track	PSA	VSA
Power (kWh / m3)	1.3-1.5	0.6
Number of Main Components	6	4
Number of Process Valves	10	3

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TECHNOLOGY PROFILE *(cont'd)*

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ADVANTAGES OF VSA OVER PSA PROCESS TECHNOLOGY

PCI's unique Vacuum Swing Adsorption (VSA) technology has several advantages over the more commonly used PSA process:

Energy Saving:

- Needs no feed air compressor (> 50% energy savings vs. conventional PSA systems)
- Load following capability reduces energy consumption even more at reduced flow rates

Installation / Operation / Maintenance / Advantages:

- Uses an oil-free blower, thus avoiding any oil carryover common with oil-lubricated compressors - great for medical applications
- Lower operating pressure minimizes the potential for water condensation
- Not as susceptible to humid environments as are PSA systems
- Single-bed VSA process eliminates virtually all process valves and required manifolds
- Low operating pressure minimizes sieve dusting (the sieve removes the nitrogen from the air), because the pressure swing is an order of magnitude lower, resulting also in lower operating cost
- VSA Adsorber sieve material has a much longer service life than that in PSA vessels - which commonly need repacking of sieve material every 3-5 years - again producing a much lower operating cost
- Shows no, or significantly less, degradation of performance at high altitude - unlike PSA technology
- Turn-key integrated solution—there is no need to size / source air compressors, dryer systems and product or feed buffer tanks

Environmental Advantages:

- No air compressor, therefore no disposal of oil saturated with compressor condensate
- Oil free design eliminating risk of oil carryover downstream of the oxygen system
- PCI utilizes a sealed adsorber bed that does not require opening to replace spent molecular sieve. Therefore there is no residual waste to dispose of
- Pollution free operation - use of electric energy
- Air cooled, no cooling water or the required chemicals for treatment

All of the above advantages reduce the cost of preventive maintenance and repairs, thereby reducing the operating cost.

LOAD FOLLOWING

PCI'S LOAD FOLLOWING "SMART CONTROL SYSTEM"

PCI's Load Following feature saves energy by slowing down the VSA blower motor during periods of reduced flow.

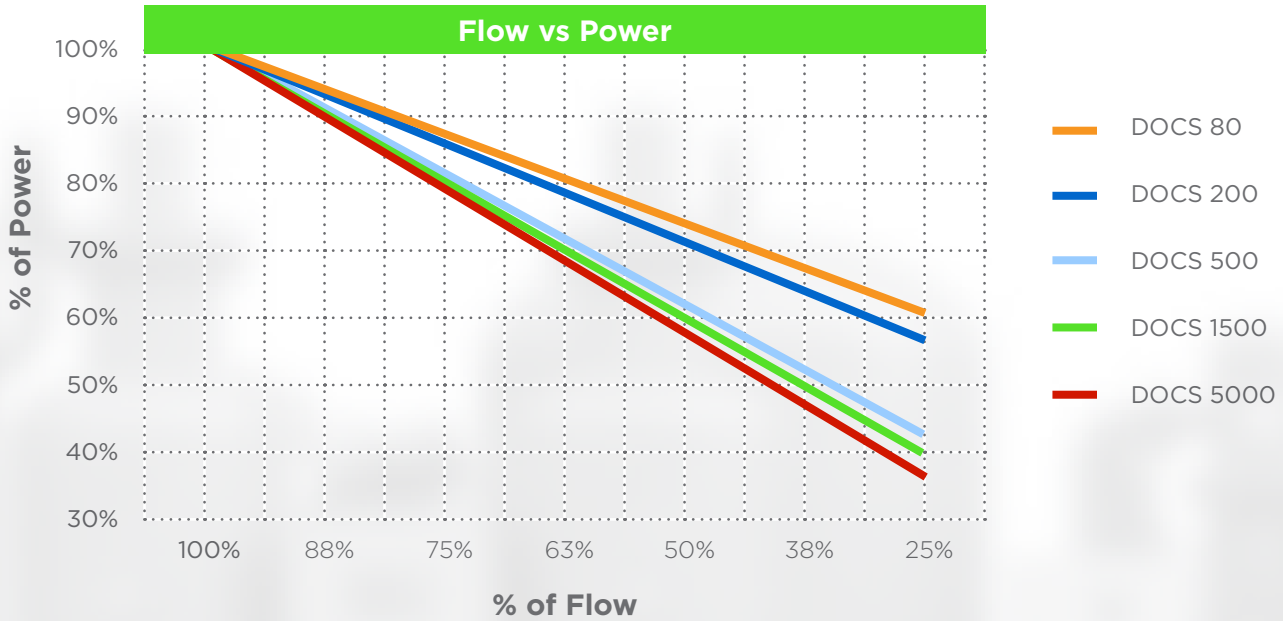
DOCS machines have a process tank which helps smooth out the vacuum swing adsorption process and provides uninterrupted gas flow. During the VSA process, the pressure in the process tank cycles between a maximum value and a minimum value. During periods of high flow demand, the minimum process tank pressure drops. When the demand decreases the minimum process tank pressure rises.

DOCS machines are programmed to maintain a minimum process tank pressure based on a Set Point which is determined at the factory. When the minimum pressure is above the Set Point, the VSA blower motor slows down to allow the minimum pressure to drop to the Set Point. Conversely, if the minimum pressure drops below the Set Point the VSA blower speeds up. Slowing the VSA blower during reduced flow saves energy. The minimum blower speed is usually set to 30-40% of full speed*.

Load Following occurs when the following conditions are met**:

1. Current minimum process tank pressure is above the set point.
2. The machine has been running for approximately 5 minutes or more.

Load following is enabled by default for all industrial units.



Other settings are possible, contact the factory for details.

***During load following the sound of the machine changes with flow. For example, it takes longer for the machine to reverse the VSA blower's direction. It is possible to set a minimum acceptable purity value that the unit will increase blower speed in order to maintain.*

REMOTE MONITORING CAPABILITY

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BUILT-IN REMOTE MONITORING FEATURE

The oxygen concentrator control system includes the ability to remotely monitor critical system functions. All start/stop/alarm/monitoring can be performed from any computer once access to the internet has been established. This feature also provides the customer or PCI the ability to log-on and monitor system performance or troubleshoot operational issues.

Features:

- Dashboard, diagnostic screen, data logging screen
- No special software required — just an Internet browser
- E-mail notifications
- Remote monitoring/start-stop capability

Benefits:

- View entire system status at a glance
- Helps prevent unscheduled downtime
- Receive alerts on faults or out-of-range conditions
- Increased productivity and reduced plant downtime with regular monitoring of on-site oxygen system

With a PCI Gases remote monitoring system, all you need is an internet browser to view the health and status of your DOCS units from anywhere in the world!

3G Router

Internet

Wi-Fi

Service and/or alarm messages can be sent via e-mail to a mobile device.

VSA ADSORBER VESSEL GUARANTEE

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DOCS PLATFORM VSA ADSORBER BED GUARANTEE

The Vacuum Swing Adsorption (VSA) process used in our Deployable Oxygen Concentrator Systems (DOCS) is based on a totally reversible cycle. Different than systems using Pressure Swing Adsorption (PSA) process technology, the water vapor in the air does not condense out during our process cycle. As a result, the molecular sieve does not degrade over time.

In addition, our molecular sieve beds have a unique design that mechanically holds the sieve media in place, thus eliminating any material attrition.

Therefore, under normal operation, standard conditions, and sufficient air quality[1], the VSA adsorber bed life is expected to be at least 10 years.

Depending on the individual site factors, PCI will warranty[2] the VSA Adsorber Bed assembly for up to 10 years[3].

This makes PCI the only company in the industry worldwide to offer such a warranty.

[1] Meets or exceeds ISO 8573-1 class 2 for particles and class 1 for oil; customer must provide test report from certified test laboratory before start-up and upon request during the warranty period. Meets all site conditions listed in PCI's DOCS standard O&M Manuals.

[2] Apart from the length of the warranty, all other provisions stated in PACIFIC CONSOLIDATED INDUSTRIES LLC TERMS AND CONDITIONS OF SALE apply.

[3] Site location must qualify. Proof of operation in accordance with PCI's Operator's Manual must exist. Proper maintenance records must be available upon request.

VSA vs PSA ARTICLE

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VSA VERSUS PSA

Total Cost of Ownership and Energy Efficiency

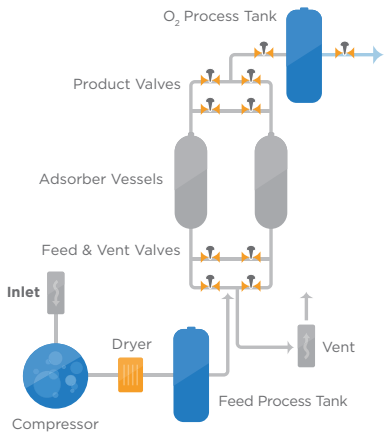
Drinking water requires the precise application of the oxygen molecule in several parts of a water treatment process train. On-site oxygen generators can be used for odor control applications and to generate ozone for disinfection or remediation. Oxygen also plays a role in wastewater treatment for aerobic digestion and in aquaculture where the demand for dissolved oxygen in a body of water rises as the number of aquatic species in the water increases. In this article, we look at on-site systems used to provide oxygen for odor control.

Pacific Consolidated Industries (PCI) (www.pcigases.com), a California-based manufacturer of oxygen generators used in water and wastewater applications, conducted an energy study on behalf of a Southern California municipality. This study compared life cycle costs of two technologies—Vacuum Swing Adsorption (VSA) and Pressure Swing Adsorption (PSA)—used to generate on-site oxygen supply for two separate lift station odor control projects. Each lift station was supplied oxygen by the competing oxygen supply technologies.

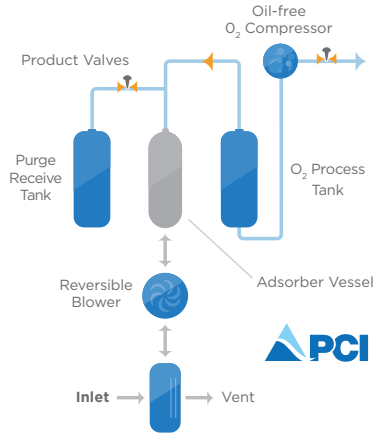
Project Background

The City of Laguna Beach, CA had odor problems at several manholes near the discharge of a three-mile-long force main (a force main is a pressurized main pipe, which can carry water, sewage, and other materials). Hydrogen sulfide (H_2S) levels peaked at concentrations of 800 ppm whereas the odor threshold from H_2S is less than 1 ppm. Additionally, the city was conscious of the potential corrosion issues associated with high concentrations of H_2S and decided to employ a novel, pure oxygen injection system from ECO_2 Oxygen Technologies. The solution system dissolves oxygen provided by on-site oxygen generation into a sidestream, which is then blended back into the force main flow. The high dissolved oxygen (DO) levels create aerobic conditions preventing the formation of H_2S, eliminating odor complaints and significantly improving the longevity of the lift station infrastructure. While this first odor control project was supplied with pure oxygen from a PSA system, in early 2009 the city installed a second ECO_2 solution where a VSA system was used to supply the oxygen. While the municipal staff was aware of the power savings associated with the VSA, they commissioned PCI to perform a power monitoring study to compare the two oxygen supply systems.

COMPLEX **PSA** TECHNOLOGY



SIMPLY STATE-OF-THE-ART
VSA TECHNOLOGY BY PCI GASES



Keeping Track	PSA	VSA
Power (kWh / m^3)	1.5	0.65
Number of Main Components	6	4
Number of Process Valves	10	3

Oxygen Technology Comparison

While PSA and VSA are both capable of delivering oxygen at concentrations ranging from 90–95 percent and use a zeolite molecular sieve (adsorption) process, there are significant differences in the main operating components and the pressures at which the units operate. Figure 1 highlights the key differences between PSA and VSA process technologies.

Central to the operation of both technologies is the ability of the molecular sieve to separate oxygen from nitrogen in the feed air stream. The feed air system of this VSA uses a reversible blower that operates at a pressure of an order of magnitude lower than the air compressor found in PSAs. This results in significant energy savings when using VSA, because higher pressures are directly proportional to higher energy consumption. PSAs also require a dryer unit to remove condensed water vapor that would otherwise foul the adsorbent material. Because VSAs operate at lower pressures, water vapor does not condense on the adsorbent material and a dryer unit is not required.

One common cause of high cost maintenance repairs is oil contamination of the adsorbent material. Many PSA compressors utilize oil-flooded screw compressors, which lead to oil vapor mixed with the compressed air. This VSA design uses an oil-free blower to eliminate this fouling problem. Another benefit of the lower pressure operating regime of VSA technology relates to the longevity of the adsorbent material. The higher pressure swings associated with PSA systems lead to attrition of the adsorbent material. This limits their useful life and requires maintenance personnel or contractors to have to repack the bed at regular intervals. This VSA design, with its lower operating pressures, is designed so that the adsorbent material will last for the entire lifetime of the equipment.

The adsorber vessel(s) allows the oxygen to pass through and produce 93 percent (+/- 3%) purity oxygen gas. In this VSA design a reversible blower is utilized for both generation and regeneration of a single adsorber vessel. PSAs, on the other hand, use complex valve systems to isolate two adsorber vessels for this generation and regeneration sequence. These valves are often one of the highest maintenance items associated with on-site generation and detrimentally affect the reliability of the oxygen system.

While the PSA does deliver higher operating pressures for the product oxygen

VSA vs PSA ARTICLE *(cont'd)*

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VSA VERSUS PSA (continued)

gas, the VSA can deliver higher pressures with an oilfree oxygen compressor on the outlet gas from the adsorber. The advantage of this design is that the oxygen compressor on a VSA is only compressing pure oxygen. This represents about one-fifth of the gas compressed on a PSA where the compression is done prior to gas separation.

The benefits of a VSA are summarized in Figure 1 (see "Keeping Track" inset). A VSA will save approximately 50 percent of the energy consumption over a PSA of equivalent size and delivered pressure. A VSA also eliminates 33 percent of the main components and 70 percent of the process valves, which increases its reliability and significantly reduces its maintenance costs.

Energy Measurements and Analysis

As part of PCI's energy study for Laguna Beach, a power meter was attached to the power supply for the compressor on the PSA system located at one of the city's lift stations. Figure 2 shows the power consumption data recorded and indicates the average power demand of 19.2 kW. Another 1.1 kW of demand that was not measured on this power line can be attributed to the dryer and controls circuit, for a total average power demand for this PSA of 20.3 kW. Conversely, the competing VSA system installed at the second lift station has a total average power demand of 9 kW for a delivered pressure of 55 psig. This indicates an average power savings of 11.1 kW for the VSA for an equivalent system in oxygen flow, purity, and pressure. The raw data for energy consumption and demand was collected by Fluke Power Log 2.8.2 and postprocessed to show the average power consumption. Assuming 90 percent utilization, the VSA reduces annual energy consumption by nearly 90,000 kWh or 55 percent of the PSA energy consumption. Since a VSA reduces energy consumption, there is often energy efficiency grant funding available that can offset the purchase price.

In addition to energy consumption savings associated with the VSA, the data also indicates that there is a demand charge savings. The PSA peak demand occurs at approximately 26 kW and the VSA at 11.6 kW, resulting in a demand reduction of nearly 55 percent.

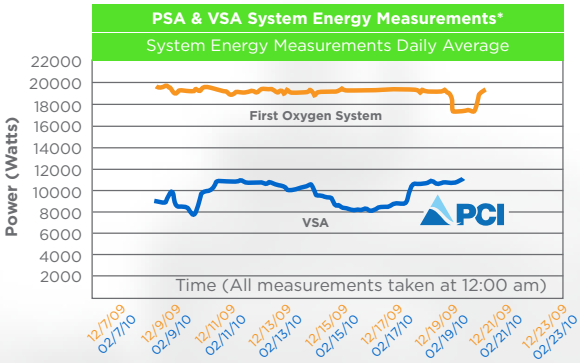
Lifecycle Cost Analysis

Utilizing the recorded power data for the Laguna Beach systems, an analysis was performed on total life cycle cost for both. In addition to the power cost savings, the simplified design of the VSA system significantly reduces the maintenance cost, which further improves the life cycle costs when compared to a PSA. Using information on actual maintenance costs and power costs, a discounted cash flow (DCF) model was performed comparing the VSA against the PSA. The 10-year DCF model assumptions were: a discount rate of 12 percent; no tax shield (municipal customer); maintenance escalation of two percent/year; and energy costs escalation of five percent/year.

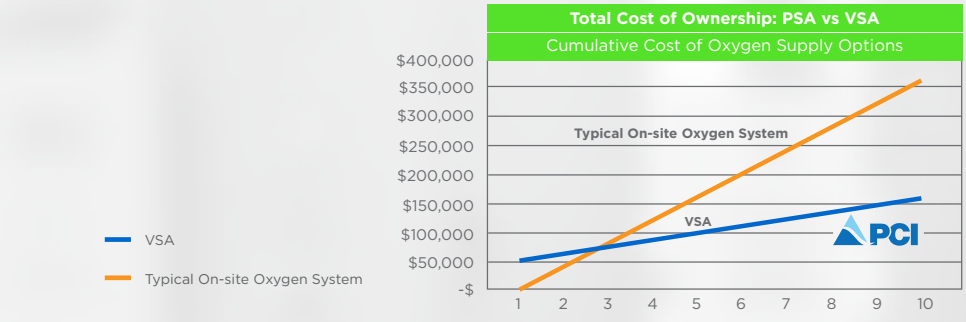
Figure 3 shows the results of the DCF model for the cumulative cash flow for each supply system. It indicates that replacing the current four-year-old PSA system with a new VSA will result in a payback in 22 months. The VSA will save the city approximately $265,000 over the next 10 years and will reduce the total cost of ownership by 65 percent.

Summary

*The power study conducted at Laguna Beach's two lift stations utilizing competing on-site oxygen generation technologies clearly indicates that there is a significant cost savings associated with VSA technology. Paybacks of less than two years can lead to significant cost savings over the lifetime of the system and save a substantial amount of energy that is directly related to greenhouse gas emissions. Over 10 years, the VSA will save the city: 870,000 kWhs of energy consumption; avoid emitting approximately 3,500 metric tons of greenhouse gases emissions; and save $260,000 in costs or 65 percent of the costs associated with a PSA. Based on the above analysis, the City of Laguna Beach decided to replace their existing PSA with a new VSA. The new 200 liter-per-minute system was installed in November 2010 and had the added benefit of a smaller footprint, which allowed the City to add additional equipment to improve the reliability of their main pump station.**



**Fluke Power Meter data recorded for both PSA and VSA systems*



INSTALLATION PHOTOS

Mining Processing Application,
Redundant DOCS 5000

Aquaculture Application,
DOCS 1500

Water Treatment Application,
Redundant DOCS 500

Industrial Wastewater Treatment
Application, Dual DOCS 5000

DOCS PRODUCT LINE OVERVIEW INDUSTRIAL

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DEPLOYABLE OXYGEN CONCENTRATION SYSTEMS (DOCS)

Deploy and generate oxygen at the point of need, on-site, without resupply logistics. PCI's VSA product flows range from 80 lpm to 5000 lpm (5 m^3/hr to 300 m^3/hr).

Deployable Oxygen Centration Systems (DOCS)

DOCS 80
80 lpm | 4.8 m^3 per hour | 340 lbs per day | 170 scfh
Dimensions: 60" L x 45" W x 55" H | 152 cm x 114 cm x 140 cm

DOCS 200
200 lpm | 12 m^3 per hour | 840 lbs per day | 425 scfh
Dimensions: 72" L x 85" W x 66" H | 183 cm x 216 cm x 169 cm

DOCS 500
500 lpm | 30 m^3 per hour | 1 tpd | 2100 lbs per day | 1060 scfh
Dimensions: 82" L x 67" W x 91" H | 208 cm x 170 cm x 231 cm

Oxygen Boosters
PCI offers oxygen boosters of various capacities and output pressures to compliment the DOCS products.

DOCS 1500
1500 lpm | 90 m^3/hr | 3180 scfh | 3.2 short tons per day
Dimensions: 24' L x 9' W x 11' H | 732 cm x 277 cm x 328 cm

DOCS 5000
5000 lpm | 300 m^3/hr | 10600 scfh | 10.5 short tons per day
Dimensions: 38' L x 16' W x 18' H | 1158 cm x 483 cm x 546 cm

CE configurations available upon request.
DOCS electrical enclosures are cUL listed.

Cost-In-Use Comparison

Example of Savings - PCI 0_2 Concentrator vs Conventional Delivery Methods

Product	Operating Cost of O_2 Concentrator						Savings vs Delivered O_2		
	per ton	per lb	per kg	per m^3	per 100 scf	per month	price of $0.15 per m^3	price of $0.35 per m^3	price of $1.00 per m^3
DOCS 80 Output Pressure 55 psig	$67	$0.034	$0.07	$0.10	$0.28	$340	35%	72%	90%
DOCS 200 Output Pressure 55 psig	$56	$0.028	$0.06	$0.08	$0.23	$700	47%	77%	92%
DOCS 500 Output Pressure 55 psig	$45	$0.023	$0.05	$0.07	$0.19	$1425	56%	81%	93%
DOCS 1500 Output Pressure 55 psig	$36	$0.018	$0.04	$0.05	$0.15	$3400	65%	85%	95%
DOCS 5000 Output Pressure 55 psig	$38	$0.019	$0.04	$0.05	$0.16	$11850	64%	84%	95%

Note: Measured at USD 0.1 per kWh cost of electricity.

DOCS 80

Industrial Configuration

Superior Reliability - Easy Serviceability
Modular and Turn-Key System For Easy Installation

ON-SITE OXYGEN GENERATOR

Characteristic	Value / Description
Discharge flow rate	80 lpm | 4.8 m3 per hour | 170 scfh | 340 lbs per day | 153 kg per day
0_2 purity @ discharge flow rate	93% +/- 3%
0_2 output pressure	10 – 100 psig | 0.7 – 6.9 barg
Operating temperature	0°F to 120°F | -18°C – 49°C
Power requirements Site power source Plant	 208/220 VAC +/- 10%, 50/60 Hz +/- 3%, 3-Phase, 50 Ampere 208/220 VAC, 50/60 Hz, 3-Phase, 28 FLA
Average power consumption	3.1 kW at 20 psig (1.4 barg) output pressure 3.3 kW at 55 psig (3.8 barg) output pressure 3.7 kW at 100 psig (6.9 barg) output pressure
Process outlet connection	1/2” Internal NPT Fitting
Unit footprint dimensions (nom.) Crated dimensions (nom.)	60” L x 45” W x 55” H | 152 cm L x 114 cm W x 140 cm H 78” L x 56” W x 67” H | 200 cm L x 142 cm W x 170 cm H
Unit weight (nom.) Crated Weight (nom.)	1,316 lbs | 597 kg 1,910 lbs | 867 kg
Average scheduled maintenance cost	$80 - $100 per month
Average operating cost @ 55 psig	$0.24 - $0.32 per 100 scf | $0.09 - $0.11 per m^3
Additional available options	Remote monitoring & diagnostics suite 4-20 mA Communication to external controller (0-10V standard) Mass flow control assembly Automatic sleep mode feature for low-demand situations Platinum 3 plus 10 Warranty

[1] Performance parameters stated at standard conditions (59°F 14.7 psia 0% RH I 15°C 101.325kPa 0% RH). Operation in atypical conditions may affect performance. For more information, please consult with your PCI technical representative.

[2] Available in CE compliant configuration.

[3] Electrical enclosure cUL listed.

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DOCS 200

Industrial Configuration
Superior Reliability - Easy Serviceability
Modular and Turn-Key System For Easy Installation

ON-SITE OXYGEN GENERATOR

Characteristic	Value / Description
Discharge flow rate	200 lpm | 12 m3 per hour | 425 scfh | 840 lbs per day | 380 kg per day
0_2 purity @ discharge flow rate	93% +/- 3%
0_2 output pressure	20 – 100 psig | 1.4 – 6.9 barg
Operating temperature	0°F to 120°F | -18°C – 49°C
Power requirements Site power source Plant	 380/460 VAC +/- 10%, 50/60 Hz +/- 3%, 3-Phase, 60/50 Ampere 380/460 VAC , 50/60 Hz, 3-Phase, 42/36 FLA
Average power consumption	7.5 kW at 20 psig (1.4 barg) output pressure 7.8 kW at 55 psig (3.8 barg) output pressure 8.2 kW at 100 psig (6.9 barg) output pressure
Process outlet connection	1/2” Internal NPT Fitting
Unit footprint dimensions (nom.) Crated dimensions (nom.)	72” L x 85” W x 66” H | 183 cm L x 216 cm W x 169 cm H 82” L x 96” W x 79” H | 208 cm L x 244 cm W x 201 cm H
Unit weight (nom.) Crated Weight (nom.)	3,148 lbs | 1428 kg 4,200 lbs | 1907 kg
Average scheduled maintenance cost	$120 - $150 per month
Average operating cost @ 55 psig	$0.20 - $0.27 per 100 scf | $0.07 - $0.10 per m^3
Additional available options	Remote monitoring & diagnostics suite 4-20 mA Communication to external controller (0-10V standard) Mass flow control assembly Automatic sleep mode feature for low-demand situations Platinum 3 plus 10 Warranty

[1] Performance parameters stated at standard conditions (59°F 14.7 psia 0% RH I 15°C 101.325kPa 0% RH). Operation in atypical conditions may affect performance. For more information, please consult with your PCI technical representative.

[2] Available in CE compliant configuration.

[3] Electrical enclosure cUL listed.

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DOCS 500

Industrial Configuration
Superior Reliability - Easy Serviceability
Modular and Turn-Key System For Easy Installation

ON-SITE OXYGEN GENERATOR

Characteristic	Value / Description
Discharge flow rate	500 lpm | 30 m^3 per hour | 1060 scfh | 2100 lbs per day | 954 kg per day
0_2 purity @ discharge flow rate	93% +/- 3%
0_2 output pressure	20 – 100 psig | 1.4 – 6.9 barg
Operating temperature	0°F to 120°F | -18°C – 49°C
Power requirements Site power source Plant	 380/460 VAC +/- 10%, 50/60 Hz +/- 3%, 3-Phase, 120/100 Ampere 380/460 VAC , 50/60 Hz, 3-Phase, 100/80 FLA
Average power consumption	17.1 kW at 20 psig (1.4 barg) output pressure 17.5 kW at 55 psig (3.8 barg) output pressure 18.9 kW at 100 psig (6.9 barg) output pressure
Process outlet connection	3/4” Internal NPT Fitting
Unit footprint dimensions (nom.) Crated dimensions (nom.) Crate 1 Crate 2	76” L x 119” W x 81” H | 193 cm L x 302 cm W x 207 cm H 82” L x 67” W x 91” H | 208 cm L x 170 cm W x 231 cm H 85” L x 82” W x 91” H | 216 cm L x 208 cm W x 231 cm H
Unit weight (nom.) Crated Weight (nom.)	5,958 lbs | 2702 kg Crate 1: 3,000 lbs | 1362 kg | Crate 2: 5,300 lbs | 2406 kg
Average scheduled maintenance cost	$160 - $180 per month
Average operating cost @ 55 psig	$0.16 - $0.23 per 100 scf | $0.06 - $0.08 per m^3
Additional available options	Remote monitoring & diagnostics suite 4-20 mA Communication to external controller (0-10V standard) Mass flow control assembly Automatic sleep mode feature for low-demand situations Platinum 3 plus 10 Warranty

[1] Performance parameters stated at standard conditions (59°F 14.7 psia 0% RH I 15°C 101.325kPa 0% RH). Operation in atypical conditions may affect performance. For more information, please consult with your PCI technical representative.

[2] Available in CE compliant configuration.

[3] Electrical enclosure cUL listed.

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DOCS 1500

Industrial Configuration

Free-standing, modularized components with pre-fabbed electrical & mechanical module interconnects for rapid, low-cost installation

ON-SITE OXYGEN GENERATOR

Characteristic	
Discharge flow rate	1500 lpm | 90 m^3 per hour | 3180 scfh | 3.2 STPD | 2862 kg per day
0_2 purity @ discharge flow rate	93% +/- 3%
0_2 output pressure	6 – 10 psig | 0.4 – 0.7 barg[2]
Operating temperature	0°F to 120°F | -18°C – 49°C
Power requirements Site power source Plant	 380/460/575 VAC +/- 10%, 50/60/60 Hz +/- 3%, 3-Phase, 300/250/200 Ampere 380/460/575 VAC, 50/60/60 Hz, 3-Phase, 240/200/160 FLA
Average power consumption	35.6 kW at 7 psig (0.5 barg) output pressure 41.3 kW at 55 psig (3.8 barg) output pressure (with external booster) 44.7 kW at 100 psig (6.9 barg) output pressure (with external booster)
Process outlet connection	2” Hose Barbed Fitting (Booster: 1” Internal NPT Fitting)
Unit footprint dimensions (nom.) Crated dimensions (nom.)	288” L x 109” W x 129” H | 732 cm L x 277 cm W x 328 cm H Please contact your PCI representative for shipping information.
Unit weight (nom.) Crated Weight (nom.)	18,800 lbs | 8535 kg Please contact your PCI representative for shipping information.
Average scheduled maintenance cost	$100 - $140 per month
Average operating cost @ 55 psig	$0.10 - $0.14 per 100 scf | $0.03 - $0.05 per m^3
Additional available options	Remote monitoring & diagnostics suite 4-20 mA Communication to external controller (0-10V standard) Mass flow control assembly Automatic sleep mode feature for low-demand situations Platinum 3 plus 10 Warranty

[1] Performance parameters stated at standard conditions (59°F 14.7 psia 0% RH I 15°C 101.325kPa 0% RH). Operation in atypical conditions may affect performance. For more information, please consult with your PCI technical representative.

[2] PCI offers an external oxygen booster for higher pressures up to 100 psig | 6.9 barg.

[3] Available in CE compliant configurations.

[4] Electrical enclosure cUL listed.

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DOCS 5000

Industrial Configuration

Free-standing, modularized components with pre-fabbed electrical & mechanical module interconnects for rapid, low-cost installation

ON-SITE OXYGEN GENERATOR

Characteristic	Value / Description
Discharge flow rate	5000 lpm | 300 m^3 per hour | 10600 scfh | 10.5 STPD | 9540 kg per day
0_2 purity @ discharge flow rate	93% +/- 3%
0_2 output pressure	6 – 10 psig | 0.4 – 0.7 barg[2]
Operating temperature	0°F to 120°F | -18°C – 49°C
Power requirements Site power source Plant	 380/460/575 VAC +/- 10%,50/60/60 Hz +/- 3%, 3-Phase, 1000/800/600 Ampere 380/460/575 VAC , 50/60/60 Hz, 3-Phase, 758/626/501 FLA
Average power consumption	135 - 140 kW at 7 psig (0.5 barg) output pressure 157 - 165 kW at 55 psig (3.8 barg) output pressure (with external booster) 162 - 170 kW at 100 psig (6.9 barg) output pressure (with external booster)
Process outlet connection	6” ANSI 150# Flange (Booster: 2.5” Internal NPT Fitting)
Unit footprint dimensions (nom.) Crated dimensions (nom.)	456” L x 190” W x 215” H | 1158 cm L x 483 cm W x 546 cm H Please contact your PCI representative for shipping information.
Unit weight (nom.) Crated Weight (nom.)	62,250 lbs | 28260 kg Please contact your PCI representative for shipping information.
Average scheduled maintenance cost	$200 - $300 per month
Average operating cost @ 55 psig	$0.10 - $0.14 per 100 scf | $0.03 - $0.05 per m^3
Additional available options	Remote monitoring & diagnostics suite 4-20 mA Communication to external controller (0-10V standard) Mass flow control assembly Automatic sleep mode feature for low-demand situations Platinum 3 plus 10 Warranty

[1] Performance parameters stated at standard conditions (59°F 14.7 psia 0% RH I 15°C 101.325kPa 0% RH). Operation in atypical conditions may affect performance. For more information, please consult with your PCI technical representative.

[2] PCI offers an external oxygen booster for higher pressures up to 100 psig | 6.9 barg.

[3] Available in CE compliant configurations.

[4] Electrical enclosure cUL listed.

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DOCS 1500 Booster

Booster sold with and connects to the DOCS 1500 oxygen generator for applications that require output pressure of up to 100 psig (6.9 barg).

OXYGEN BOOSTER

Characteristic	Value / Description
Discharge flow rate	1500 lpm | 90 m3 per hour | 3180 scfh | 3.2 STPD | 2862 kg per day
0_2 Output Pressure	20-100 psig | 1.4-6.9 barg
Operating Temperature	0° F to 120° F | -18°C to 49° C
Power Requirements Site power source Plant	 380/460/575 VAC+/-10%, 50/60/60 Hz +/- 3%, 3-Phase, 70/50/40 Ampere 380/460/575 VAC, 50/60/60 Hz, 3-Phase, 35/25/20 FLA
Average Power Consumption	3 - 4 kW at 20 psig | 1.4 barg 5 - 6 kW at 55 psig | 3.8 barg 8 - 9 kW at 100 psig | 6.9 barg
Process Outlet Connection	1" Internal NPT fitting
Unit Footprint Dimensions (nom.) Packaged Dimensions (nom.)	82"L x 44"W x 115"H | 208 cm L x 112 cm H x 246 cm H Contact PCI for packaged dimensions.
Unit Weight (nom.) Packaged Weight (nom.)	1,350 lbs | 613 kg Contact PCI for packaged weights.

[1] Performance parameters stated at standard conditions (59°F 14.7 psia 0% RH I 15°C 101.325kPa 0% RH). Operation in atypical conditions may affect performance. For more information, please consult with your PCI technical representative.

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DOCS 5000 Booster

Booster module for supplying DOCS produced oxygen at pressures up to 100 psig (6.9 barg). Module is equipped with 4 to 6 parallel compressors depending on site location and application pressure requirements.

OXYGEN BOOSTER

Characteristic	Value / Description
Discharge flow rate	5000 lpm | 300 m3 per hour | 10600 scfh | 10.5 STPD | 9540 kg per day
0_2 Output Pressure	20-100 psig | 1.4-6.9 barg
Operating Temperature	0° F to 120° F | -18°C to 49° C
Power Requirements[2] Site power source Plant	 380/460/575 VAC+/-10%, 50/60/60 Hz +/- 3%, 3-Phase, 150/120/90 Ampere 380/460/575 VAC, 50/60/60 Hz, 3-Phase, 100/75/60 FLA
Average Power Consumption	20 - 22 kW at 20 psig | 1.4 barg 22 - 25 kW at 55 psig | 3.8 barg 25 - 28 kW at 100 psig | 6.9 barg
Process Outlet Connection	2.5” Internal NPT Fitting
Unit Footprint Dimensions (nom.) Packaged Dimensions (nom.)	129”L x 49”W x 116”H | 328 cm L x 125 cm H x 295 cm H Contact PCI for packaged dimensions.
Unit Weight (nom.) Packaged Weight (nom.)	5,150 lbs | 2340 kg with five (5) compressors Contact PCI for packaged weights.

[1] Performance parameters stated at standard conditions (59°F 14.7 psia 0% RH I 15°C 101.325kPa 0% RH). Operation in atypical conditions may affect performance. For more information, please consult with your PCI technical representative.

[2] Data for booster with six compressors.

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ON-SITE OXYGEN SOLUTIONS

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