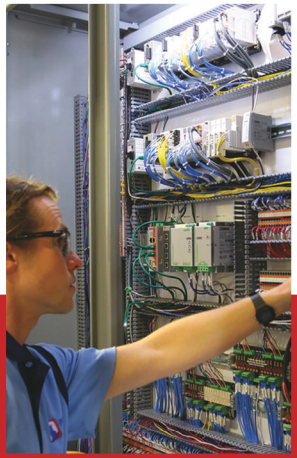

Case Study:
FCI Watermakers

OEM improves large-scale seawater reverse osmosis system design with groov EPIC

OPTO 22
The Edge of Automation.™

Opto 22

43044 Business Park Drive • Temecula • CA 92590-3614
Phone: 800-321-6786 or 951-695-3000
Pre-sales Engineering is free.
Product Support is free.
www.opto22.com

Form 2306-201228

CASE STUDY: FCI WATERMAKERS

OEM improves large-scale seawater reverse osmosis system design with groov EPIC

Question: What do a yacht owner, an island resort, and a Las Vegas chef have in common?

Answer: They all need a reliable source of good fresh water—and they all count on FCI Watermakers to provide it.

THE COMPANY

From small yachts to offshore oil platforms, from fish hatcheries to resort hotels, customers of FCI Watermakers know their freshwater need will be satisfied, whether it's for just 200 gallons or for 260,000 gallons per day (GPD).

The West Valley, Utah-based company has been building freshwater systems since 1992. Most are skid-mounted systems that primarily convert salt water to fresh water via reverse osmosis, but several other technologies are also used depending on the customer's needs.

Starting with two product lines in 1992, the company has expanded to offer a wide range of systems, large and small, for customers worldwide.

"If it floats or is surrounded by water," says Scott McGuire, President of FCI Watermakers and founder of the company, "that's where we are."

McGuire got his start in the field in the 1980s at the age of 18, working for a company that designed reverse osmosis systems for pleasure yachts. He soon found he had his own ideas about how those systems should be engineered and manufactured. To put them into practice, he started Filtration Concepts, Inc. (FCI).

High-quality systems

The quality and longevity of FCI's systems set them apart from competitors in the field. Their systems are designed to be easy to use and service, with options for completely automated operation or manual controls. An open-frame design for most of their products makes it much easier for customers to service their systems, as components are placed for easy access and maintenance.

FCI products are manufactured to high standards and typically built for marine environments; they are ship certified and marine grade. The HMI panel FCI uses is the only one in their field that is marine certified and uses resistive touch technology, so customers can use it while wearing gloves.

The result of this attention to quality and serviceability is less downtime, more fresh water, and high customer satisfaction.

While yacht systems are the company's bread and butter, McGuire finds the bigger, more unique systems more challenging and therefore more interesting from an engineering standpoint.

The chef

For example, the pastry chef at a hotel in Las Vegas was frustrated that his baked goods didn't come out the way he expected, and he finally traced the problem to the local water.

The chef was used to New York City water, which is filtered through granite and has an excellent reputation for taste. It has a specific pH and total dissolved solids (TDS) profile, and those qualities in the water affect the performance and taste of baked goods. TDS include inorganic salts (calcium,

"If it floats or is surrounded by water, that's where we are."

- Scott McGuire, President, FCI Watermakers

magnesium, potassium, sodium, bicarbonates, chlorides, and sulfates) and some small amounts of organic matter.

FCI designed a custom system that filters and treats the local water to bring it up to the chef's standards.

The resort

One of FCI's larger customers is a resort in the South Pacific. Surrounded by seawater, the island has little fresh water. When their old system of converting seawater to fresh began to fail, they looked to FCI for a replacement.

Goals were not only to have a sufficient volume of water, but also to convert it using as little energy as possible. Diesel-run generators provide all the power on the island, and electricity is very expensive.

FCI solved both problems by providing a custom-designed skid-mounted freshwater conversion system for the resort. Not only does it provide plenty of fresh water for all the resort's needs, but it also massively reduces energy costs by running on 30 hp rather than the previous 100 hp. FCI can recover up to 40% of energy by using pressure exchanger technology, which captures energy in the brine stream and then feeds it back into the system.

THE CHALLENGE: CONTROLLING CUSTOM SYSTEMS

As an original equipment manufacturer (OEM), FCI builds their own controls for their products. When custom orders and larger systems became a bigger part of their business, McGuire began looking around for more flexible automation tools.

"Three or four years ago, ladder logic was the best fit for our V4 HMI/PLC," says McGuire, but he began looking for a control system that would be easier to use and to scale. The V4 PLC was limited to a finite amount of I/O, which was fine for smaller systems but too limiting for larger ones. Instead, McGuire wanted to have everything they needed built into one unit.

THE SOLUTION: *groov* EPIC

One of FCI's customers introduced them to Opto 22's *groov* View, a browser-based software tool for building an operator interface to systems and equipment. The interface can be viewed on mobile devices as well as computers—anything with a web browser, from a smartphone to a web-enabled HDTV.

Building a Titan system in the FCI Watermakers factory

FCI was impressed by the ability to log in remotely and see data on their systems. They also liked the simple drag-drop-tag method of building the operator interface and the ease of integrating data from multiple systems and software.

Then McGuire learned about Opto 22's new control system, *groov* EPIC®. It sounded like the kind of flexible and scalable system he needed for their larger custom water systems.

A completely new product based on Opto 22's 45 years of experience as an automation manufacturer, *groov* EPIC (EPIC stands for edge programmable industrial controller) combines industrial-grade hardware with the software, HMI, and communication tools engineers need for the future.

Hardware

With stainless-steel construction, solid-state drives, UL hazardous locations approval, and ATEX compliance, *groov* EPIC can withstand the tough environments where FCI's systems are installed. Chassis sizes are available accommodating up to 4, 8, or 16 I/O modules, and analog and discrete I/O modules offer 8 to 24 channels.

For even greater scalability, an EPIC processor can act as a supervisory controller for other controllers and for Opto 22 SNAP PAC I/O units.

EPIC's integral high-resolution color touchscreen makes commissioning and troubleshooting the system easier, a key feature for OEMs as well as field technicians. The included HDMI and USB ports mean an external monitor, HMI panel, keyboard, and mouse can also be easily added when needed.

Software

Because *groov* EPIC is designed to use industry and IT (information technology) standards, integration and data transfer are much simpler for both automation and industrial internet of things (IIoT) applications.

EPIC software includes:

- Multiple programming options (flowcharting, IEC 61131-3, C/C++, Java, Python, and more)
- *groov* View for visualization
- Ignition Edge® (a product of Inductive Automation®) for OPC UA connections to PLC systems
- MQTT/Sparkplug for secure and efficient data communications

***groov* EPIC (center), being installed in an FCI Watermakers' Titan system**

- Node-RED for exchanging data with databases, cloud applications, and APIs

THE RESULT

McGuire had some concern that *groov* EPIC was a new product when they began using it, but he knew Opto 22 had been a well-respected controls manufacturer for many years. He found the company's technical support to be "outstanding."

With EPIC, FCI can scale custom systems infinitely. McGuire says they can save costs by initially programming all available features into the controller, and then simply turning features on or off to meet an individual customer's requirements.

In addition, EPIC includes flowchart-based PAC Control software as a control programming option. Now that they've used PAC Control with *groov* EPIC, McGuire says, "This block stuff is really the way to go. It takes a third of the time to program as ladder logic."

Case Study: FCI Watermakers

McGuire continues to appreciate the *groov* View application for building a custom HMI. FCI can easily build an HMI for the customer, which authorized users can view locally on the EPIC's integral high-resolution color touchscreen or from anywhere on any device with a web browser.

Using *groov* View, FCI can run the system remotely if need be, give customers quick training on their phones, and support clients in the field, an ability that further distinguishes the company from their competitors.

Both FCI and their customers use the *groov* View HMI. For the system at the South Pacific resort, McGuire can monitor flows, pressures, and water quality on his smartphone. He can also add a camera and see video of the equipment as it's running. The general manager and facilities manager at the resort also have smartphone visualization.

McGuire also appreciates the periodic service packs Opto 22 releases to update the *groov* EPIC system. FCI can deploy these software updates from their offices in Utah to systems at customer sites. This ability came in handy recently when a hurricane caused bad connections to the South Pacific location.

FOR THE FUTURE

FCI is looking into other capabilities in *groov* EPIC that would be useful for their customers, especially sending email or text notifications to managers or technicians when an event occurs, and logging system data for analysis and design improvements.

McGuire also mentions a new venture FCI is working on now, which he says, "probably couldn't have been done without EPIC." The new venture involves five processes, a different medium than water, and a large skid-mounted system.

Whatever it is, FCI Watermakers will engineer a reliable system to produce the results the customer needs—and McGuire will rely on *groov* EPIC to provide the monitoring, control, visualization, and data processing it requires.

For more information on the company, visit fciwatermakers.com or call FCI Watermakers: **800-850-0123** (toll-free in U.S.) or **801-906-8840**

***groov* EPIC**

ABOUT OPTO 22

Opto 22 was started in 1974 by a co-inventor of the solid-state relay (SSR), who discovered a way to make SSRs more reliable.

Opto 22 has consistently built products on open standards rather than on proprietary technologies. The company developed the red-white-yellow-black color-coding system for input/output (I/O) modules and the open Optomux® protocol, and pioneered Ethernet-based I/O.

In early 2013 Opto 22 introduced *groov* View, an easy-to-use IIoT tool for developing and viewing mobile operator interfaces—mobile apps to securely monitor and control virtually any automation system or equipment.

Famous worldwide for its reliable industrial I/O, the company in 2018 introduced *groov* EPIC® (edge programmable industrial controller). EPIC has an open-source Linux® OS and provides connectivity to PLCs, software, and online services, plus data handling and visualization, in addition to real-time control.

All Opto 22 products are manufactured and supported in the U.S.A. Most solid-state SSRs and I/O modules are guaranteed for life.

MADE IN THE USA

The company is especially trusted for its continuing policy of providing free product support and free pre-sales engineering assistance.

For more information, visit opto22.com or contact Opto 22 **Pre-Sales Engineering**:

Phone: **800-321-6786** (toll-free in the U.S. and Canada) or **951-695-3000**
Email: systemseng@opto22.com

MADE IN THE USA
OPTO 22 www.opto22.com
43044 Business Park Dr. Temecula, CA 92590-3614

SALES sales@opto22.com
800-321-6786 • 1-951-695-3000

SUPPORT support@opto22.com
800-835-6786 • 1-951-695-3080