The Virtues of Technology

By Shawn Stevenson

No one knows what the future will hold; but one thing is for sure it will be more complex in terms of technological advances. If the intentions of these advancements are progress; life should become more simplified since menial tasks can be more easily accomplished. Many of the luxuries we take for granted are deeply rooted in Technology. Technology according to one definition is "the sum of the ways in which social groups provide themselves with the material objects of their civilization." (technology. (n.d.). *Dictionary.com Unabridged (v 1.1).* If you don't think you are dependent on these advancements, consider the last time the electricity went out and how many necessities and activities ceased to be at your disposal.

The effects on your life due to these technological marvels are unmistakable. Contemplate the differences in the world today compared to that of your great grandfather's time. The automobile is a prime example of a lifestyle changing innovation from that previous era. To more clearly illustrate the changes that have taken place recently, consider the evolution of the cell phone, and how it is now firmly engrained into modern society. An item that we can hardly function without today was reserved for the elite only a mere 15 years ago.

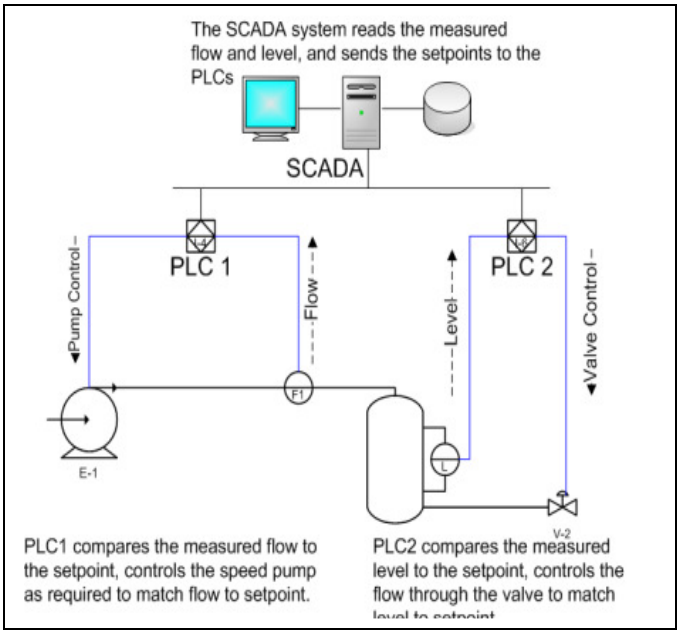
Although several advancements are related to scientific achievements, some areas blossom while others seemingly fall by the wayside. I believe this quote from "The Maze of Ingenuity" provides an interesting perspective. "The relationship between science and technology defies easy definition partly because it is highly sensitive to differences in institutions and values and thus varies from one country to another." This supports the argument that technology as a whole is subjective; the success of a certain technology is therefore dependent on numerous factors. For example technological advancements are specific based on budgets and other social factors.

Technology has a place in just about every profession and the driving force behind any good idea is marketability. This is not to say that a good idea on paper will translate to and effective tool. For all intents and purposes, the topics discussed will be in generic terms and of somewhat limited scope. With so many ground-breaking options, this article can only scratch the surface.

Computers and peripherals are constantly advancing in speed and reduced stature; components are becoming more powerful in smaller packages. Computers offer an infinite range control to different situations. One such technological advancement linked to computer control is SCADA-**Supervisory Control and Data Acquisition.**

The term SCADA usually refers to a central system that monitors and controls a portion of a water system that can be spread out over a long distance. The bulk of the site control is actually performed automatically by a Remote Terminal Unit (**RTU-** is a device which interfaces objects in the physical world to a distributed control system or SCADA system by transmitting telemetry data to the system and/or altering the state of connected objects based on control messages received from the system). A SCADA system can also be controlled by a Programmable Logic Controller (PLC) which is a microprocessor that alters machinery in real time based on operator set input or output (http://en.wikipedia.org/wiki/SCADA).

Host control functions are almost always restricted to basic site over-ride or *supervisory* level capability. For example, a PLC may control the flow of water through a portion of the distribution system; the SCADA system allows an operator to change the control setting for the flow (http://en.wikipedia.org/wiki/SCADA). Potential alarm conditions such as loss of pressure or a spike would be recorded and displayed.



The SCADA system usually presents the information to the operating personnel graphically, in the form of a mimic diagram. This means that the operator can see a schematic representation of the plant being controlled. For example, a picture of a pump connected to a pipe can show the operator that the pump is running and how much fluid it is pumping through the pipe at the moment. The operator can then switch the pump off. The HMI software will show the flow rate of the fluid in the pipe decrease in real time. Mimic diagrams may consist of line graphics and schematic symbols to represent process elements, or may consist of digital photographs of the process equipment overlain with animated symbols (http://en.wikipedia.org/wiki/SCADA, 2007).

The remote capabilities of SCADA systems offers flexibility to on-call staff with the ability to monitor plant operations from the home; as is the case with at least one state of the art system in Oregon. The versatility of SCADA is also apparent in wastewater applications where periodic probing and testing are necessary multiple times daily. A SCADA system can put monitoring temperature and dissolved oxygen (D.O.) at the fingertips of the plant operator. This type of technology enables staff to work on specific duties, saves man hours, and provides data for areas that aren't easily accessible based on either weather conditions or location.

Turbidity meters are complex devices internally and yet can provide an easy to read display of water quality before and after treatment. In simplified terms the meter is reading the amount of light passing through a water sample. Solids that are suspended hinder light transmittance and thereby can be measured according to set standards. Early iterations of turbidity meters were limited to a narrow range of turbidity measurements. Like any invention, improvements in design are constantly being made, leading to increased accuracy for a wider range of particle content levels.

Furthering the understanding in the optical properties of water and how solids reflect and absorb light, led to significant achievements in meters. The subsequent result was the determination that the placement of the light receptor perpendicular to the light source transmits the light scattered by particles more efficiently, thereby making more accurate nephelometric measurements. The nephelometric turbidity unit (NTU) is the accepted standard and is the measurement of light scatter within a water sample. Meters vary in price based on measurement ranges, interfaces and levels of accuracy. In the field the use of portable versions can expedite observations and testing. As in most cases advancements in the higher end units provide benefits to the introductory level consumer, but smaller budgeted systems might still consider them too expensive.

Everyone has a specific tool, which although very simple in practice, works surprisingly well. Whether it is in your toolbox at home or at the shop, some of the best tools are the most straightforward by design. One such tool is the diffusing dechlorinator; its design makes it easy to use and most models can be hooked up in several configurations. The premise of the device is to reduce chlorine residuals to acceptable regulated levels. Water flowing through the device mixes with a chamber that contains a form of a vitamin C or sodium sulfide normally in tablet form; the water is aerated by several baffles located in the diffuser during the process. As water exits, the Chlorine levels are reduced, making compliance of released chlorinated water a fairly straightforward process. Flow capacities vary based on manufacturer specifications and many can be used in high and low flow applications with the necessary accessories.

Some of the items discussed are very innovative but the cost or scope of the item will make it only applicable to certain water systems. What is an invaluable tool to a water district serving several thousand consumers will not necessarily be a necessity for a small rural system serving 20 residents and vice versa. After attending multiple conferences countrywide, the water business has no shortage of pioneering ideas for large and small systems alike.

Technology definitely has the ability to aid water systems in all areas; but many inventors could testify that success of an item is directly linked to timing and the industry's perception of its usefulness. Some might argue that technology has an opposite effect by making simple things more complex. The truth of the matter is that depending on the situation, an argument could be made either for or against certain technologies. Like anything in

the proper application technological advancements can make the world a better place to live and work in. As long as dependency on automation is kept in check, the virtues of technology will continue to shine through.