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The 7 Habits of Highly Successful Controls Engineers

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Summary

Highly successful control engineers didn't become that way by accident. The most successful engineers develop habits that improve results and recognition of those results. This paper addresses specific habits that you can develop or enhance to be more successful.

Overview

The 7 Habits listed in this paper were developed from over 20 years, working with thousands of control engineers around the world. I have seen some people who struggled to identify their results, and others who had great results, but couldn't get recognition. In this paper, we'll look at some of the habits that have ensured success for the most successful of these engineers.

7 Habits

The 7 Habits listed in this paper are:

1. Know the Process.
2. Focus Only on the Most Important Things
3. Document the Baselines
4. Use Tools to be More Effective
5. Network and Communicate Results
6. Keep Learning
7. Share Your Knowledge

In the pages that follow, we'll look at each one of them, and provide some suggestions for how you can improve your own rate of success.

Habit 1 - Know the Process

Knowing the process is the first and most important habit for control engineers. To be effective in the automation and control of a process, you must **first** have a thorough understanding of the process.

To develop process knowledge takes time and effort. Start by studying process flow diagrams and P&IDs. Trace the primary product as it flows through the process, highlighting it on the drawing with a colored marker.

Talk to operators. They work with the process day in and day out. They understand a lot about how the process normally behaves. They also know about the abnormal, unusual things that can happen during equipment failures, shutdowns, start-ups, and shift changes. The process doesn't always behave according to the text book. Make sure you know what to expect in abnormal situations.

Learn More At Night

Some of the best learning experiences in my career came on the night shift, work You can work with the operators, get to know them better, and learn from their experience. You might even develop some operating experience of your own!

The best advice I could give to a controls engineer is to spend a few weeks on-shifts with the operators.

With a little bit of process knowledge, tools like Process Interaction Mapping can help you to pinpoint the source of control upsets.

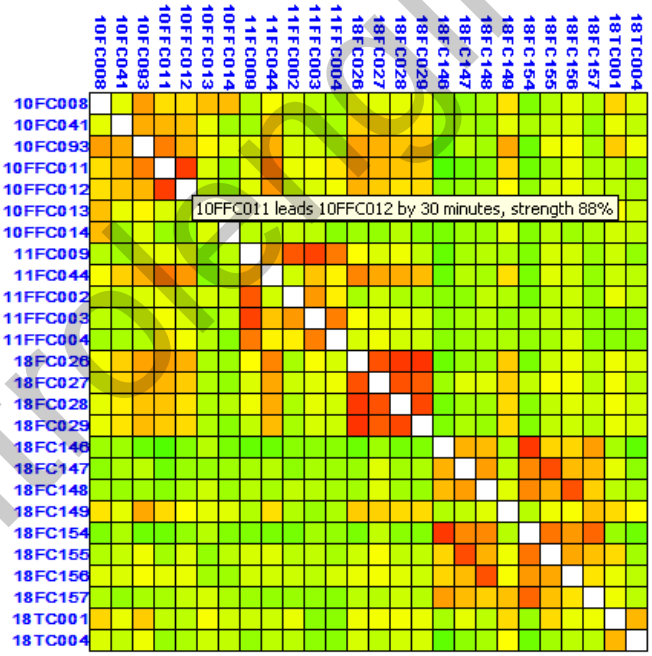


Figure 1. Interaction Hot Spots identifies the source of interactions

Focus on the Most Important Things

It is so easy to lose focus in a plant environment. There are daily disasters, fire-fighting, management meetings, projects, and a hundred other distractions. The challenge, of course, is to stay focused on those activities that will deliver the most value to the business. As Stephen Covey says, in *First Things First*, "The main thing is to keep the main thing the main thing".

In a process manufacturing environment, the "Main thing" is usually some combination of these factors:

- Unit Cost
- Production Rate
- Quality
- Energy Costs
- Reliability
- Environmental & Safety

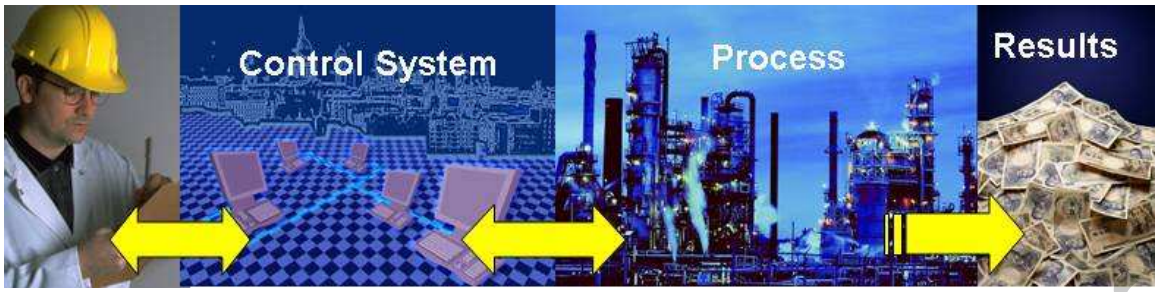
It will be very difficult to prove success if you cannot link your work to one or more of these factors.

Document the Baseline

If you don't know where you started, how will you know how far you have come?

I have seen people make this mistake many times over in my career. Successful engineers always take time to understand the starting point. The starting point should always be measured in business terms. You can supplement with some technical measures, but you should always establish a good baseline of business metrics, such as those mentioned above.

Discuss the baseline conditions with an operations manager or financial person, to make sure that you understand what the numbers mean. This also helps ensure that you are working on the right things. Be sure to use the exact same methods to measure these metrics. If they measure profit in dollars per truckload, then you should, too.

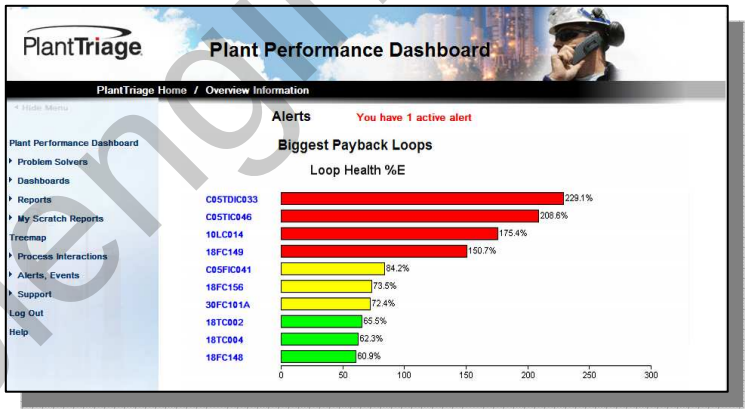


The technical measures are a good supplement, but only if they can be linked to the business metrics. For example, if you are trying to improve quality (reduce %rejects, for example), it may be a good idea to track a technical metric such as variability. You can make a strong case that reduced variability has a direct impact on reducing the amount of reject material.

Improve Your Effectiveness with the Right Tools

I can admit that, as an engineer, I love to dig in to the details, and use my engineering knowledge to sniff out the root cause of a problem. This is part intuition, part experience, and partly that engineering mindset. If you love to solve problems, it can be easy to overlook that there may be some much simpler ways to get the job done.

For example, people often ask how to find control loops that are performing poorly. We could go through the exercise of looking at each loop, analyzing it, and coming up with a list of the top 10 issues. Chances are that this would take a long time, because I would definitely get side-tracked into solving some of these problems along the way.



To make this job go much faster, I use the control loop monitoring tools in PlantTriage. Based on a few key metrics, PlantTriage will give me a top-10 list automatically. It already has all the data, because it monitors the process 24 hours a day.

And sometimes, you have to get your ego out of the way. All control engineers think they can tune loops quickly by hand. “Quickly”, yes. “Properly”, not very often. Use a software tool to get the answers quickly and properly.

These days, most companies have downsized their engineering staffs considerably. You simply don’t have the time to be inefficient at any aspect of your job.

Communicate Results & Network

This is probably the most important of these 7 habits. If you do great things, and nobody knows what was done, you have lost.

Networking is a critical part of this. I'm not talking about computer networks, but people. Make sure you have credibility with a wide array of people. Think outside your normal workday routine. Set up lunch meetings with some of these people:

- The Plant IT Manager
- Your Counterparts in Other Departments
- The Plant Financial Guru
- Instrument Techs
- Operations Managers
- Purchasing Agents

This will be a challenge at first. But you will find that this helps you to develop stronger relationships in the plant. These relationships will be helpful as you communicate your results.

When you get some good results, you will need to communicate them clearly, concisely, *and in business terms.* Remember the baselining discussion above? Go back to your baseline measurements, and show how your work had an influence on the bottom line.

When it comes to communicating, keep it simple. Don't write a 200-page report. Nobody will read it. Instead, send a short email with "Before and After" pictures, and just a little bit of back-up material. The subject line of the email should be something like: "$120,000 Savings on the De-Chlorinator". That email will be opened, read, and forwarded to others.

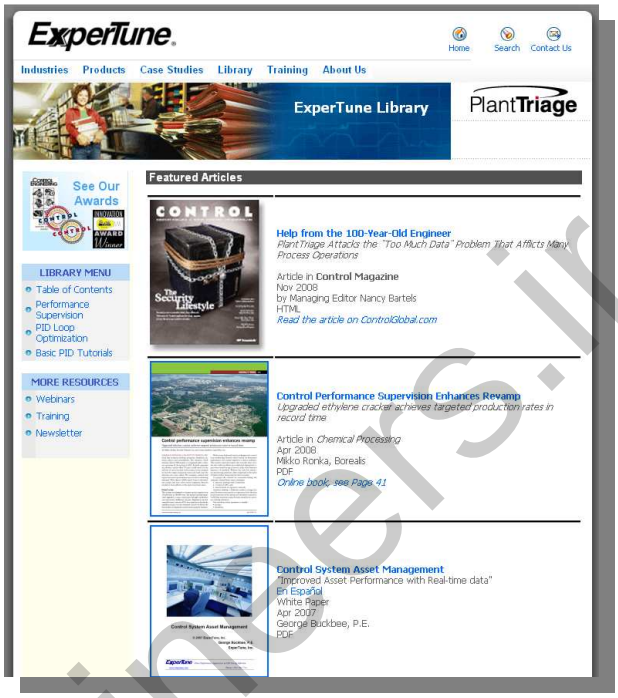
How much value can you bring? It certainly depends on your role. With some effort, a typical control engineer should be able to document between 6 and 10 times their annual salary in savings. This may come from any combination of the business results areas listed in the baseline section.

If you're not sure how to document your value, visit some of the case study examples on our web site at: http://www.expertune.com/customersuccess.html

Keep Learning

Never stop learning. One of the great mentors in my career was Virgil Colavitti. Virgil had been working in the same plant for over 40 years. He seemed to know the inner workings of every machine, instrument, valve, transformer, and other device under the sun. In working with him, I learned why. He had a natural curiosity, and he was never

afraid to ask questions. In a group of people, he would often say, "I wonder how that works…" And sure enough, someone would explain it.



Today, you have a huge number of training resources available. You can take training course in your plant, at a training center, or over the web. You can quickly find books and articles that delve into every possible subject.

Be careful! Make sure you are working with a credible source of information. Published authors and established companies are a great source of information. But some on-line sources have little editorial control, and their accuracy is questionable at best.

ExperTune, of course, has been widely recognized for over 20 years as a source of deep knowledge in the field of process control. Check out our on-line library at: http://www.expertune.com/articles.html

ExperTune's training courses are practical, hands-on training, designed to help you be extremely effective at managing control loops in your facility. For more information, go to: http://www.expertune.com/classoptreg.html .

Share Your Knowledge

Typically, 20% to 30% of all control loops are running in Manual. That should be shocking. Why don't people step up and take notice? One reason may be that they simply don't understand the significance.

Process control is not well-understood by "lay people". Twenty years after paying for my college education, my parents still have only a vague understanding of what it is that a process control engineer actually does.

Even within the plant environment, there is often a vague mystery associated with process control. We use strange terminology, and talk about abstract things like "dynamics", "dead time", and "derivative". Many plant people are simply confused by the topic. Sharing your knowledge with others can help to make you and them more effective.

For your own success, if people understand what you do, they will have a better appreciation of the value you bring to the company. It's hard to downsize someone that brings a lot of value!

Because other people often have limited process control knowledge, even sharing a little bit of your knowledge may be tremendously useful. For a while in my career, we used a lot "single point lesson plans". These were simple, one-page training aids. So you could do a short 3-minute training session on topics like:

- "What is Cascade Control?"
- "Why we use filters on our instruments"
- "How to test the over-speed interlock"
- "How to prevent valves from sticking"

Whenever I was called in to resolve a problem at night, I always followed up with a single-point lesson the following day. I figured that I would not need to be called in again on the same problem if 10 other people knew how to resolve it. You can be as formal or as informal as you wish. The key point is to help spread some knowledge around.

Conclusions

Your results will improve and be recognized if you pay attention to the 7 Habits discussed in this paper. A typical control engineer should be able to document between 6 and 10 times their annual salary in savings.

Documented results are key to success. Make sure you have the right tools and training to be successful in your company.

About ExperTune

About the Author

George Buckbee is V.P. of Marketing and Product Development at ExperTune. George has over 20 years of practical experience improving process performance in a wide array of process industries, George holds a B.S. in Chemical Engineering from Washington University, and an M.S. in Chemical Engineering from the University of California.

About PlantTriage®

PlantTriage is a Plant-Wide Performance Supervision System that optimizes your entire process control system, including instrumentation, controllers, and control valves. Using advanced techniques, such as Active Model Capture Technology, PlantTriage can identify, diagnose, and prioritize improvements to your process.

Glossary

Term	Definition
DCS	Distributed Control System. A centralized process control system that typically provides data collection, operator interface, and control functions.
I/O	Input & Output.
KPI	Key Performance Indicator. A metric that can be used to monitor overall performance.
OPC	OLE for Process Control. An industry standard communications protocol, allowing
OPCHDA	OPC Historical Data Access. An enhancement to the OPC protocol that allows data to be pulled directly from standard data historians.

Term	Definition
ROI	Return on Investment. Measured as the amount of time needed to fully recoup an investment.