



# Advanced Process Control: PID tuning is the first step

## Overview

More than a hundred years ago, Sperry Corporation invented automatic pilot control in airplanes. It was magical and scary at the same time. Nowadays, they can anticipate the exact arrival time, other planes nearby, and the weather forecast.

It became unimaginable that our planes would fly without it. APC is the automatic pilot in plants. APC projects can maximize your performance and plant's profit. For decades, the chemical process industry has been working with it. It can benefit smaller plants considerably as well. However, proper PID tuning is the first step in an APC project. It is the foundation for your automatic plant pilot, learn in this blog why.



## What is advanced process control?

In the process industry, 99% of the APC (advanced process control) are MPC (model-based predictive control) systems. MPC controllers measure the interactions of all plant actuators and process parameters in the distillation column and predict, based on a model, what needs to be done over a time horizon. You can compare it to an operator with 20 years of experience that focuses 100% of his time on operating the plant and predicting the outcomes. With those years of experience, he can anticipate things that are about to happen.

## PID tuning is the first step in an APC project

The APC communicates with the plant via the setpoint of the PID loops. Even with APC PID controllers still there, in auto and fully functioning. The PID controller is responsible for the base layer control of the plant, the quick variations in the loop, and runs at 10 to 100 Hz. The MPC controls typically run every 30 seconds up to every 10 minutes and change the setpoints of the underlying PID controllers.

APC's can deal with interactions between system variables. It's able to handle constraints and change the strategy if needed. But your first step is PID tuning. Here are four key takeaways that you need to consider when starting an APC project:

- **No successful APC without “optimal” underlying PID controllers**  
To have a fully working MPC, the PID controller is set in automatic control. But for the PID controller to be in fully automatic mode, it needs to be tuned correctly. Poorly tuned PID controllers are a nightmare because the MPC will not be able to regulate the plant properly. Perfect tuned PID controllers make the lives of the APC engineer much more manageable. They will have simple models, and it's easier to step-test.
- **Already a part of the APC project benefits is realized during the PID tuning.**  
In case a plant is not APC ready, the base layer optimization might still be a good first project to start on. With low costs, low risk, you will be able to reach great benefits, such as; maximize stability, production and profit. The APC will put the cherry on the cake and optimize it even more.
- **Find relevant information during the PID tuning**  
During the PID tuning, you will also perform a review of all relevant instrumentation and actuators. As said before, the PID controllers need to be set right first, so a lot of the hardware will be scrutinized before the APC project can start.
- **Build trust that control performance brings benefits**  
Especially when the first APC project is installed in a control room, one can often sense the doubts of the operators. Will the software make them irrelevant? How can that piece of software make more product compared to us? The answer to the first question is simple: as pilots are still needed to fly planes with autopilots when something happens, also operators are needed to startup and shutdown plants. And to be present when incidents happen or when major changes happen.

Often the doubts evaporate after the first step in the APC project. PID controllers are all in automatic, the plant runs more stable already and less alarms pop up. The life of the operator becomes easier. For the production manager this initial PID tuning work results in more production, reduced energy consumption.

This first step often creates trust within the control room that good control brings benefits. The path for the remainder of the APC projects is now paved.

## Want to start with an advanced process control project?

Next to operator ease, APC reduces process variations, and you will be able to move to a better operating point. Optimal PID control is excellent in enhancing your operating point, but APC can do it even better.

APC will contribute to move up to a higher profit because you can lavish even closer towards the limit. The APC keeps on improving and optimizing to eventually, your loop will not have variations, and it is almost a flat line.

So, without proper PID tuning, you cannot start with an APC project. But even in this preliminary project, you can see the significant benefits. Not only big chemical process industries can set up an APC project.

**If you want to know more or want a demo, please contact one of our experts [here](#)**