PAC

Process Analytical Chemistry - Data Acquisition and Data Processing

Main location	Linz (Upper Austria)
Other locations	Kundl (Tirol), Salzburg, Lenzing (Upper Austria), Krems (Lower Austria), Vienna
Thematic field	The PAC Consortium has set itself the goal of gaining valid chemical information directly from the process streams in real time. This information shall open up new potentials for the optimization of chemical processes in various industries.

Success story summary

Manual sampling of toxic substances is replaced by fully automated NIR-measurement:
In one of the production processes at company partner Nufarm in Linz, an intermediate stage of a manufactured product, is highly toxic. Until now ten samples had to be taken and had to be analysed in the laboratory every day. Despite being enormously careful, there have already happened serious accidents. The use of automated measurement techniques and advanced methods for process analytics will make it possible to almost completely replace these dangerous sampling by on-line measurement in the near future.

Success story

We are in the year 2015. Jakob, who is an experienced long-time employee of the company, walks over to his PC and takes a look at the values of the DCP-concentration measurement. “Perfect”, he says to himself, “the chlorination is virtually finished. This was a perfect batch!” He operates some controllers and buttons, in the huge plant this and that starts to click, to hum and to move and the finished product is discharged into the surge tank for further processing.

Jakob thinks back to the times, when things were not this convenient at all. He did not have to bail or to install lines, the finished product was already pumped electrically in the past. But he had to put on the protective clothing up to five times per day. Then he had to take a 200-milliliter sample of this damn toxic liquid from the huge reactor. He always had to be extremely careful; the suit had to be absolutely tight. The fear always stayed: What if something goes wrong? If you don’t take enough care it can lead to a serious chemical burn. In a comparable factory an employee had even lost his life…

About 6 years ago his boss came around and told him about his idea of integrating a novel measurement technique. Infrared spectroscopy could be a solution for monitoring the production progress without sampling and laboratory analysis, he thought. But this job was not simply done by integrating a sensor. His idea could only take shape by taking part in the research project PAC – Process Analytical Chemistry. The researchers of various institutes collaborated in this project to develop the measurement techniques and data evaluation to such a level of reliability that today the better part of the dangerous manipulations can be replaced by automated measurements.

Jakob gets himself a cup of coffee. “Research is really cool“, he thinks. And while he is waiting for his coffee to be finished, he ponders on, “How much research could there be in the coffee dispenser? Or in the coffee itself? Or…“

Impact and effects

Although the current status of the K-project PAC is today, in 2012, not as advanced as told in this story from the year 2015, the researchers are on a good way to make this vision come true. Until now ten samples of a highly toxic reaction stage of DCP had to be taken and analysed in the laboratory every day. Through automated measurement techniques and optimized methods of process analytics it will be possible in the near future, to almost replace this dangerous sampling through online-measurement.

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