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R+B Technik develops the Hybrid Control for controlled pigging processes

For a constant speed during air/air driven pigging

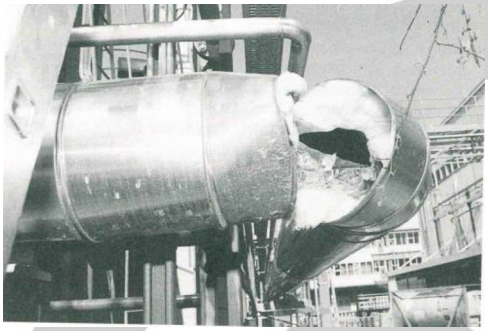

Figure 1: Destroyed bend by uncontrolled pigging [1]

Figure 2: Wear at too high speeds [2]

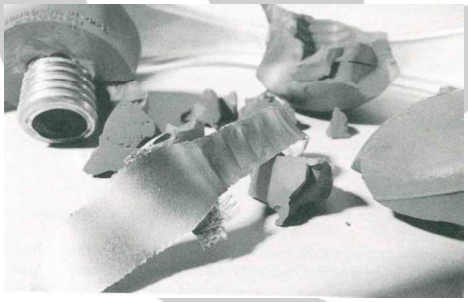

Figure 3: Pig destroyed by uncontrolled pigging [1]

Consequences of an uncontrolled pigging process:

In order to be able to control pigging processes better, different pigging cruise controls have already been developed. The propellant medium flow of these regulators is pressure-dependently controlled.

Pressure control seems to be promising in theory, because a pig builds up resistance during its travel by friction and this resistance is only brought into balance with the driving pressure. A constant pressure in the pipeline would therefore mean a constant pigging process.

In practice, on the other hand, the friction and the driving required pressure varies significantly. If the propelling pressure is regulated low, the pig is driven slowly and gently, but can get stuck quickly with increased friction. In order to drive off, it then needs more pressure to overcome the static friction. It then shoots uncontrolled through the line, gets stuck again (stick and slip effect) or is damaged if it hits the end of the pig line. An increased propelling pressure counteracts sticking, but increases the speed of the pig and its wear enormously.

Figure 4: Sheared off pig after impact [2]

Figure 5: Torn sealing lips due to excessive speed [2]

Pigging cruise control by R+B Technik - Hybrid Control:

The pigging cruise control developed by R+B Technik offers another possibility of control. It records the process parameters pressure, temperature and mass flow in the pipeline and controls the propellant medium used on the basis of the mass flow, whereby the pig is driven at a defined speed.

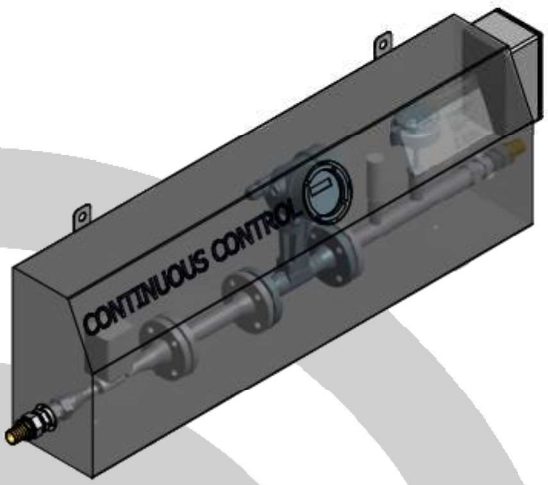

Figure 6: Hybrid Control by R+B Technik

The system reacts to a pig that is slowing down due to increased friction and ensures that the propelling pressure is increased for a short time, thus maintaining speed and preventing it from stopping. This means that pigs can be driven gently at the required speed, reducing wear and thus significantly increasing plant availability and safety.

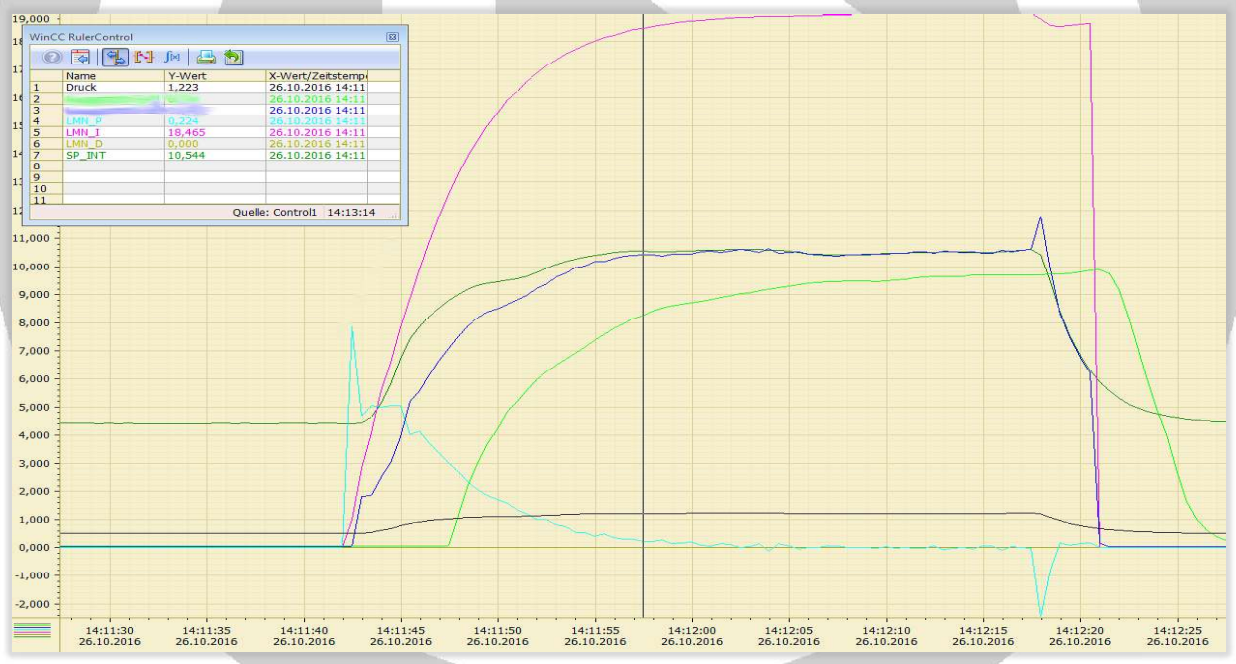

Figure 7: Smooth pigging process with the R+B Hybrid Control

In figure 7 the process parameters are plotted over time during an air-air driven pigging process performed on our test stand. The fast and individual intervention of the speed controller on deviations of the pigging speed ensures smooth pigging processes as shown in the figure.

In order to be able to evaluate pigging concepts in advance, R+B Technik set up its own test stand. Not only the Hybrid Control and its settings are tested here, but also different pig types and material combinations in order to find an individual and functioning solution for each customer's special application.

Figure 8: Pig launching station of the R+B Technik test stand

We kindly invite you to convince yourself of the functionality of the Hybrid Control in our company. Come and see us!

General information on pigging:

In practice, pigging processes are used to empty and clean pig lines with a pig after the pumping of product.. This saves resources as well as costs and time, as the pipeline does not have to be flushed at great expense, which also results in large quantities of wastewater.

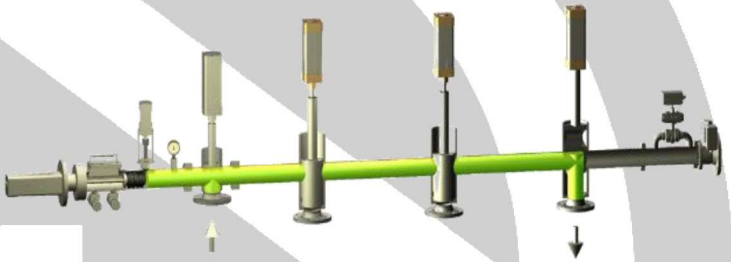

Figure 9: Pumping product

The pigs can be pushed through the pig line with a propellant medium. Returning the pig is usually realized with compressed air as propellant medium, so that the pig line can be used again for another product afterwards. It is also possible to use only compressed air as the propelling medium in a pigging system.

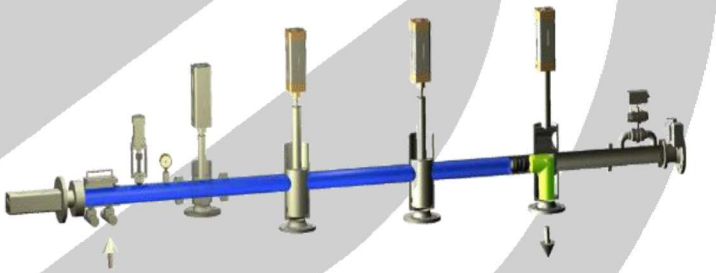

Figure 10: Pigging the product into the target

In practice, it happened almost without exception, that the pigs had a very unsteady driving pattern and tended to become a missile, which greatly increased the wear of all components and especially of the pigs, thus

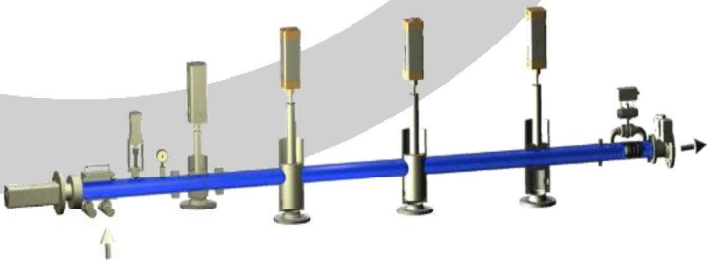

Figure 11: Cleaning the pig in the receiving station

leading to the destruction of pigs and in the worst case to a breakdown of production.

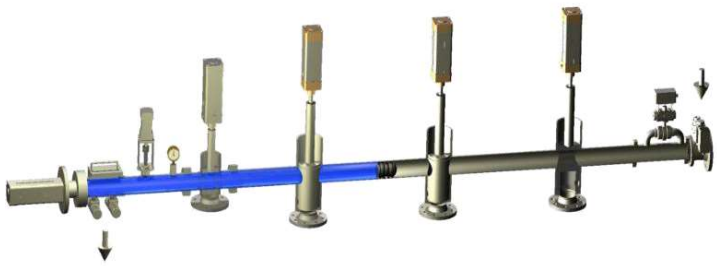

Figure 12: Pig return with air as propellant medium

For questions we are at your disposal at any time. Please contact us!

[1] Hiltscher, G. et al.: Molchtechnik: Grundlagen, Komponenten, Anwendungstechnik; Wiley-VCH, 1999
[2] Original production site footage