Detecting faults long before the damage

IT company IM&P from Saxony-Anhalt develops innovative software for the maintenance of machines

A key term of Industrie 4.0 is Predictive Maintenance, the anticipatory servicing of machinery and plants. The young IT company Indalyz Monitoring & Prognostics (IM&P) from the German federal state of Saxony-Anhalt has developed a unique piece of prognostic software that uses artificially intelligent algorithms to predict when which component of a machine will break down and have to be replaced.

Wind energy plants are already predominantly constantly monitored by sensors. Such sensors measure, for example, the machine noise produced by the running plant. These sound waves are characteristic of each individual plant and reveal what technical condition their single parts are in. If a specified tolerance has been exceeded, the plant must be serviced or in the worst case switched off. Entirely regardless of whether the point in time is unfavourable because the weeks-long stoppage takes place e.g. precisely during the most wind-rich days in spring or autumn. The common maintenance strategy, which is based on monitoring of the current state of machinery and plant, thus has disadvantages. The solution is so-called “predictive maintenance”. This is now a key term of Industrie 4.0.

And a young IT company from Saxony-Anhalt is a pioneer in this field: Indalyz Monitoring & Prognostics (IM&P) GmbH from the city of Halle, located in the south of the federal state, develops predictive software-based maintenance strategies for individual machines, complex plants and machine clusters. Malfunctions are thus detected while they are arising by artificially intelligent algorithms long before the critical machine state is reached. The user can thus organise service, material and personnel optimally, which in turn reduces the operating costs.

“Our software can predict the wearing of technical systems. At the moment we can predict for the period of half a year whether a component of a wind park system has to be replaced, for example”, says Professor Michael Schulz of IM&P. For many years, the physicist has researched the subject of artificial intelligence (AI) and developed his Predictive Maintenance Software Solution at the University of Ulm and the university Technische Universität (TU) Chemnitz up to readiness for the market. The IM&P programme uses artificial intelligence for the maintenance prognoses of machines for the first time. Previously, this was only usual in space travel or military technology. “Our prognosis software is based on self-learning, artificially intelligent core algorithms, which are themselves combined with different intelligent filters and projective methods. Past and current sensor data are compared with engineering, technical and manufacturer-specific parameters and supplemented with other relevant information such as the climatic conditions at the site. “During this, the prognostic system trains itself. This did not previously exist in this level of complexity”, says Professor Michael Schulz. Other prognostic procedures are based above all on the analysis of statistics and findings gained from many years of experience.

Using artificial intelligence for the maintenance management of machines is new. The start-up IM&P of Michael Schulz at the Technology and Founders’ Centre (TGZ) at the Weinberg Campus in Halle (Saale) has only existed since October 2015. “The TGZ with its well-developed infrastructure and the university as a partner is an ideal site for us”, says Schulz. All five employees so far have come from the university, he says. In addition, Saxony-Anhalt is strategically favourably located in Germany, especially for a maintenance software provider for wind power plants like IM&P. Because the young company is focussing on wind power as the first major area or application of its products. In a three-year observation and prognosis of technological condition, IM&P analysed the data from 1.5 million measurement time series from 650 wind power plants. “Just under 95 percent of our forecast wear alarms proved accurate in practice”, says Michael Schulz. Only 0.5 percent of the component malfunctions that occurred were not displayed by the system and in the remaining 4.5 percent, the system was over-cautious and recommended a repair.

The prognostic software can however be used in many other fields, if individually adapted. These include power stations, rail vehicles such as goods wagons, engines and special-purpose vehicles. In addition to this, there are already outline proposals for the use of the prognostic software from Halle in small and medium-sized hydroelectric power plants, and for pumping and piping systems of the natural gas and crude oil industry – such as in the monitoring of leaks as they arise.

Author: Michael Falgowski
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