Press Release

Hardheim, April 2020

Technical University of Denmark joins the ranks of devotees of EIRICH mixing technology

Since the introduction in 2005 of the "mixer with sequence automation and process data control," initially known as the "mixer with university control," more than 50 institutions around the world have utilized this technology in their mixers. The control system – currently offered as the Premium Touch Control – not only records the mixing work that has been performed, but also allows mixing tasks to be pre-selected ahead of the mixing process or its sub-steps. This helps users to discover new findings that were previously unavailable. Many diploma theses and degree dissertations have attested to the excellent results that are achieved with these mixers. Now the Faculty of Civil Engineering at DTU Danmarks Tekniske Universitet is also going to start using this technology.

Standard concrete mixers, regardless of whether single-shaft or twin-shaft mixers, whether ring trough mixers, planetary mixers or conical mixers, have mixing tools that run comparatively slowly and transport the material being mixed in a stationary mixing container, thereby mixing it in the process. To ensure that all the material is picked up and mixed, the tools need to run close to the bottom and side walls. Any material trapped between the tool and the edge will cause friction and wear, which means that part of the energy input into the mixing process is lost. Even minor changes e.g. to the grain size or moisture of the material will yield completely different figures if the performance is recorded. Reproducibility and reliable performance recording are not possible. In addition, publications from universities in around 1980 showed that even slight increases in the tool speed lead to demixing, meaning that prolonged mixing can be counter-productive.

In an Eirich mixer, a further development of the planetary mixer originally invented in 1906 by Eirich, the material being mixed is transported through an inclined, rotating container. The process of mixing is performed by a rapidly rotating mixing tool, which is known as the rotor and has almost no contact to the bottom of the mixing pan and can

therefore be operated with tool speeds up to more than 30 m/s. Together with the stationary wall/bottom scraper and two small bottom cleaning blades on the rotor, this significantly reduces friction and wear. Reproducibility and reliable performance recording are now possible with this setup. And since the material is fully mixed within a single rotation of the pan, these mixers perform their mixing duties without any demixing at all.

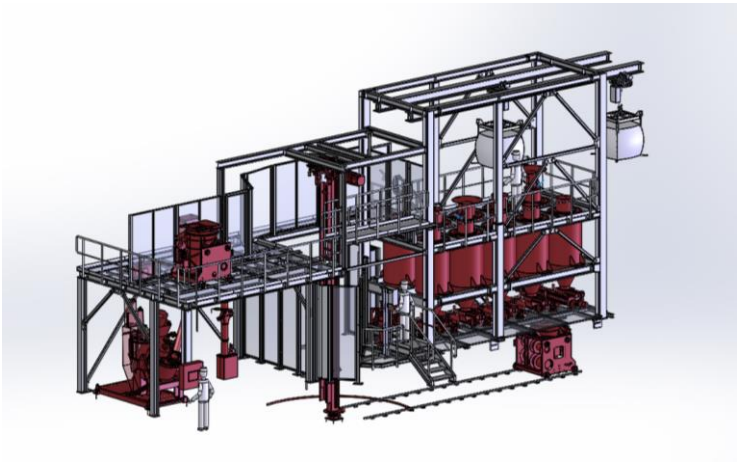

Fig. 1: EIRICH plant concept for DTU

In the past it was not possible to quantitatively record and describe mixing processes. When producing simple types of concrete, approximate uniformness and homogeneity is achieved on the basis of empirical values. But, when developing new concretes, access to empirical values is limited. The “university control” system developed in close collaboration between Eirich process engineers and university employees registers and not only records all machine parameters (such as the speed of the mixing pan, the speed of the mixing tool, the power consumption of the mixing pan and the tool, and the temperatures of the mixture), but it also determines the relevant power input into the mixture. The mixing procedure is thus documented and 100% reproducible. By monitoring the energy input it is possible to keep track visually of when the concrete is "ready."

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Mixers are available with a usable volume from 40 L as laboratory mixers for construction materials, and the results can be feasibly upscaled to large production mixers. Mixer sizes between 1 L and 3000 L only use one mixing tool (rotor). The material flow conditions in the small mixer correspond to those in a large mixer, making upscaling very straightforward.

The Faculty of Civil Engineering at the Technical University of Denmark (DTU Byg) has now also started using the Eirich system. From its headquarters in Lyngby near Copenhagen, DTU is one of the best-ranked universities in the world (according to ranking lists available on the Internet), and it will be opening a new laboratory in November 2020 for concrete and material research in civil engineering. The expanded options that can be opened up for mixing technology by using an Eirich mixer of the size R09T (usable volume of 150 L) will open up a whole new world of discovery for the Materials department and will help them contribute to making Denmark more “green.” In terms of concrete, this ideally means reducing the amount of concrete used or replacing it altogether. Another research institution in Denmark – the Danish Technological Institute – is also involved in the project, and again they are also using Eirich mixers. In a report about Copenhagen broadcast on March 29, 2019, 3sat reported on the “green concrete” developed here and showed the mixers. With the aid of a new type of cement, 30% CO_2 savings are expected to be achieved for construction materials.

Among other things, the new plant being supplied by Eirich to DTU features 10 silos for aggregates and binding agents as well as an automated dosing system. A movable balance supplies both the new Eirich mixer (150 L) and another existing mixer (250 L). The dosing, weighing and mixing systems are all located on a highly-effective dedusting system. In line with the wishes of DTU, the system will also be available to external research and industry partners for joint research projects and trials.

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The EIRICH Group, with Maschinenfabrik Gustav Eirich as its strategic center in Hardheim, is a supplier of industrial mixing, granulating/pelletizing, drying and fine grinding machinery, systems and services. EIRICH has core expertise in processes and techniques used for the preparation of free-flowing materials, slurry and sludge. The main fields of application for such technologies include e.g. ceramic and refractory materials, foundries, building materials such as concrete and plaster, battery pastes, fertilizers, glass and the processing of ores. Close co-operation between our own test centers around the world and collaboration with the research and academic community enables the "hidden champion" to provide solutions for innovative, cost-efficient products and processes. The family-managed company was founded in 1863 and operates from twelve locations on five continents.