

**Project title:** Simulation-aided control of the drying process in the paper industry

**Main applicant:** The Paper Industry Technical Association (PITA)

**Technology developer:** CF ProcSim GmbH, AutomationX GmbH and Perceptive Engineering Limited

**Industry partners:** Smurfit Kappa Townend Hook

**Demonstration capital cost:** £759,075

**Funding awarded:** £424,223

**Project timeline:** October 2019 to February 2021

**Project description:** The Paper Industry Technical Association (PITA) is leading a consortium of technology developers looking to install and demonstrate a novel simulation-aided control system to enhance the drying process on paper machines. Current state of the art solutions in the paper industry already use Advanced Process Control (APC) to optimise parts of the machine such as the wet end, machine direction variables and other sheet quality parameters. However, this data driven, simulation-aided approach enhances that control, and after extensive process testing can create a 'digital twin'. The simulated-aided APC developed in this project will use rigorous techniques to overcome some the limitations of a more traditional data driven approach. The simulated process model is used to control the paper machine and can eliminate the need for additional sensors by creating virtual sensors that allow for a level of optimisation that cannot be achieved through a conventional solution.

CF ProcSim and AutomationX will be working together with PITA to develop the technology and then working with the process integrator, Perceptive Engineering, will apply the new simulation aided control to the drying process on a paper machine at Smurfit Kappa's Townsend Hook site. There has been no application of the technology to the paper sector in the UK to date.

When complete, the demonstration should provide evidence that the technology can be utilised in the paper sector and other industries. Energy savings are expected to be achieved in the following ways:

- A reduction in the steam used on the Paper Machine drying process.
- Increased output of the heavier paper grades, which are normally limited by steam drying capacity.
- A significantly extended information system for the drying process leading to enhanced quality control.
- The capability to generate data in errors that were previously inaccessible to conventional sensor technology provides papermakers with a valuable new tool for future, unknown applications.

**Size of target market:** The demonstration site has an annual paper production of circa 260,000 tonnes. The immediate target markets are the UK paper and board mills, which have a combined annual production in excess of 3.4 million tonnes. It is estimated that the technology could be applied to 70% of the mills currently operating in the UK. It may also be possible to directly apply the same technology to other similar sectors that require product drying, including moulded pulp, particles boards, wood, and cellophane, and develop variants that can be used in organic product drying (such as potatoes).

**Barrier to market:** The technology is currently completely new to the paper industry. As it is unproven, it is unlikely to be adopted by the market until it has been demonstrated successfully in the industry. This project will demonstrate that the technology can be applied in the process conditions found on full scale paper machines.

**Initial TRL:** TRL 6

**Targeted final TRL:** TRL 8

**Estimated energy and carbon savings:** It is expected that an energy saving of 5.6% of current consumption will be made through the application of the technology at the demonstration site. If these savings could be achieved at 70% of the UK paper and board industrial sites, an annual energy saving of over 200 GWh would be made.

**Why IEEA funding was important to this project:** The IEEA funding is allowing the consortium to successfully demonstrate a technology that is completely new to the paper and board industry on a working mill. This is key to the eventual roll out of the technique across the industry as it is unlikely that the required funds could have been raised internally to finance the demonstration without IEEA assistance. The IEEA support also adds significant standing to the results of the demonstration project.