

IAQ QUALITY SUSTAINABILITY AWARD 2020 - ONE-PAGE SUMMARY

The One-Page Summary should be filled in and submitted as Appendix 1 to your Application. It will also be published on the IAQ Quality Sustainability Award Homepage; <http://iaqaward.com>. The length of this document must not exceed 1 page.

Project and contact details

The name of the quality sustainability project (max. 100 characters)		
Commercial sales of 3D printed windows in biomaterial, applying PDCA methodology and quality tools in an agile way		
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Organisation(s), country where the project-members are working, including Web-page links		
Nordan AB, Sweden https://www.nordan.se		

Project description

In 2018 and 2019 NorDan AB conducted a highly successful R&D project applying Quality Management philosophy, methodology and tools in order to achieve significant results regarding Sustainability. The NorDan project developed a production technique, material solution, product documentation and marketing concept for 3D printed windows in bio-composite material, with a Scandinavian market product launch in October 2019. The company has gained momentous attention and recognition for their pioneering efforts in 3D printing within the building industry, especially from a sustainability perspective.

Throughout the entirety of the project, the PDCA Cycle (Plan-Do-Check-Act Cycle) was applied in an agile way and with many iterations to make progress towards the overall project goal; to be the first window manufacturer to start commercial sales of 3D printed windows in a modern, sustainable material. As an integrated part, root cause analysis and cause-effect diagrams were applied numerous times in order to better understand the challenges in the project and agree on necessary actions to move the project towards its overall goal. Also, the application of the Pareto principle helped the project team to scope the project efficiently and identify “the vital few from the trivial many”.

In the PDCA cycle work, it was often found that the ‘Plan and Do’ phases were relatively easy to undertake. However, the team believed that the real power of improvement and learning came from the work conducted within the ‘Check’ phase. This is where data was gathered from testing in the 3D printer followed by analysis, which meant that the team could better understand the causes and make a good basis for the ‘Act’ phase where main learning and action points were concluded, forming the basis for subsequently moving into a new PDCA cycle.

Additionally, during the early phases of the project, NorDan explored numerous options for printing materials, which included the likes of ABS thermoplastic polymer granulates. However, NorDan’s focus on Sustainability directed the project to concentrate more greatly on finding the most sustainable material possible so that the 3D printed windows would remain in alignment with the other products in NorDan’s timber range. Introducing the bio-composite materials into the 3D-printing process caused significant variation in the material properties and printing process, but with the PDCA cycle and quality tools it was possible to reach a stable and well-working 3D printing process.

The innovation highlighted by NorDan, with the 3D-printer project, is part of NorDan’s ‘ecoDigital ready’ strategy. This is the trade-marked initiative of the NorDan Group, which highlights the company’s commitment to sustainability and digitalisation. As part of this strategy, the company has worked actively with the UN Sustainability Development Goals and have made concrete plans for improvements and initiatives within six of the SDG goals. The following three UN Sustainability Development Goals have been focused on in the 3D-printer project: GOAL 9: Industry, Innovation and Infrastructure. GOAL 12: Responsible Consumption and Production. GOAL 17: Partnerships to achieve the Goal

Based on the degree of success achieved through this project, the company has launched various additional schemes testing the 3D printing of entrance doors and square windows. Furthermore, in collaboration with their biggest customer, NorDan AB have established a process for recycling used windows. This highlights the potential for companies in developing new services and business models, within the sustainability remit, that are geared towards customers.

A key learning takeaway for NorDan AB is that Quality Management and Sustainability should be applied at a strategic level within the company. Quality Management is vital to ensure that there is a key focus on customers and high-quality outputs, whereas Sustainability ensures conscious choices are made regarding the environment and resource utilization. Furthermore, Quality Management with its methodologies and tools offers a very strong supporting frameworks in project management execution and fact-based decision making in an agile way.

Project leverage potential

Regarding additional options for 3D printing, NorDan has in subsequent projects managed to 3D print door leaves and also 3D printed frame-profiles to be used as a complete door set. In the future it could well be possible for NorDan and other companies to place 3D printers at the customers’ construction sites and produce products at the site with a significantly lower carbon footprint.

The potential of this quality sustainability project is very high. The technology opens up for a flexible production, closer to the end-market and construction sites and thereby reduces transportation needs. Also, given that the technology is based on additive manufacturing using bio-composite material, it opens up for sustainable production of many different kinds of products in a wide range of branches.

Picture/Image describing the project

