**Concurrent Engineering and Social Distancing 101: Lessons Learned During a Global Pandemic**

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1. **Introduction**

On 11 March 2020, the Director-General of the World Health Organization declared the novel coronavirus disease 2019 (COVID-19) a global pandemic prompting the need for immediate targeted action to reduce the chances of infection [1]. In this regard, the introduction of social distancing measures became a key and often mandatory preventive strategy in many countries to delay the epidemic peak so that healthcare systems were able to cope with an increased influx of patients. The suspension of face-to-face contact and non-essential travel for workers has serious implications for many sectors and workplace activities, including the concurrent engineering process of products. This approach requires engineers to work systematically and collaboratively within the same facility in order to decrease the need for multiple design reworks [2]. Therefore, until lifted, the implementation of social distancing measures leaves two possibilities for its application: either suspend all concurrent engineering activities or attempt them remotely. Although the second option may diminish the quality of the concurrent engineering process, it is clearly the more appealing approach despite the unprecedented challenges and obstacles that it may present. This is because it minimises interruption to business whilst continuing to drive innovation. Accordingly, this paper will present the successes, challenges and lessons learned from an entirely remote concurrent engineering session for the first time, including issues/obstacles faced and how they were embraced/overcome.

1. **Methodology & Expected Outcomes**

In the frame of the mandatory social distancing measures put in place due to COVID-19, the University of Strathclyde conducted a remote concurrent engineering study for a Phase 0 spacecraft design between 18 May and 22 May 2020. The purpose of this study was to support the application of an internal student-led CubeSat project to ESA Academy’s ‘Fly Your Satellite from the ISS’ programme. The study participants relied on video conferencing to discuss and connect remotely to the Collaboration and Concurrent Design Studio (CCDS) at the university. This meant that more than ever, the centralisation of subsystems data on the OCDT server was essential to maintain sight of the design evolution. Evidently, this required the traditional methodology applied within previous non-virtual studies run from the university’s CCDS to be adapted in order to account for technical, procedural and behavioural differences. The outcome of this on the quality of spacecraft design was measured through the flow of information passing through the OCDT server and by benchmarking the level of definition compared to a similar non-virtual concurrent engineering study which took place at the CCDS in 2019. The impressions from study participants who took part in both the virtual and non-virtual studies were also collected to quantify perceptions on levels of participant interaction, study flexibility and their understanding of the process. This information was used collectively to discuss successes, challenges and lessons learned from this remote concurrent engineering study.

1. **Conclusion**

This paper synthesises the successes and challenges that arose during the remote concurrent engineering study conducted by the University of Strathclyde. It presents methods of best practice for embracing and overcoming these to provide future project teams with information that can increase the effectiveness and efficiency of remote concurrent engineering sessions and build on the experience and lessons learned from the Strathclyde team. This should simplify the future application of the practice if a scenario requiring it to be implemented ever arises again.

1. **References**
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