

## LSSA-CNC- Challenges in Large Scale Subtractive-Additive CNC Machine

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Nowadays, the Large Scale Subtractive-Additive CNC Machines are used in rapid prototyping of superior parts for very sensitive systems used in aerospace and maritime technology. In this paper, design of a production platform of a Subtractive-Additive Machine is considered. The unit has workspace  $2.5 \times 6.5 \times 0.5$  meter with two heads that operate simultaneously. Each of the two processing heads will have 5 DOFs. While one is used for subtractive processing the other one does the additive processing and both work simultaneously capable of handling the products up to 500 Kg in weight. The Subtractive-Additive machine uses laser deposition welding with powder nozzle where the specimen thickness depends on size of powder, laser and nozzle geometry. In this study, many of the challenges of large scale systems, such as; large working area with escalated problems in design and operation, large weight handling of specimen, simultaneous operation of two heads/multi-heads, which may affect the response time and complication of production, effects on the precision of movement by using elevated magnetic bearing system, effects on the precision of the size on the end product, complexity of movement strategy, mutual effects of the two heads as integrated, vibration (mechanical as well as electrical EMI) as well as thermal effect and heat treatment during manufacturing has been considered and solutions to overcome such problems are suggested.

### Biography

Mehran Ektesabi has completed his PhD in 1989. He has more than 30 years of experience in design and development of control and drive systems. Presently, he is with Faculty of Science, Engineering and Technology at Swinburne University of Technology, Australia. He is an active Member of IEEE, Founder Chair of IEEE Vehicular Technology Society (VTS) Victorian Chapter and Consular of IEEE branch in Swinburne. His major areas of expertise and research are power electronics, electric motor control systems, power quality controllers, energy saving and compatibility, renewable energy systems, intelligent and autonomous control, soft computing adaptive control and system identification.

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