# PE WSQ in **Improve Machining Productivity through Dynamics Analysis and Simulation**

Course Introduction

Milling and Turning dynamics analysis and simulation are critical for achieving high productivity from precision machined components, which are of great economic importance to any precision industry including component machining, machine tool, mould-die, aerospace, computer and defence. This course provides participants with practical and systematic training on machining dynamics analysis and simulation technologies that can be used to achieve high productivity with good surface quality, as well as high geometrical accuracy and efficiency.
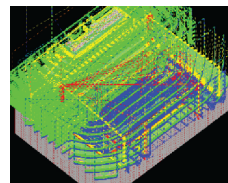
Quick CNC

Quick Milling and Turning Vibration Solver and Optimizer

Customisation

Aerospace

Die/Mold

Oil/Gas

Electronics/ Medical Components

Machine Tools/ Tooling

Success

Who Should Attend

The roles that this unit would be relevant to include, but are not limited to:

- Operations managers/ Manufacturing managers/Engineers
- Production planning engineers/Materials engineers/Mechanical engineers
- Production engineers, foremen, and skilled operators
- Quality control managers/engineers, Materials purchasing engineers
- Laboratory managers and engineers
- University students specialising in materials science /mechanical engineering
- Companies that do general machining jobs
- Companies in the manufacturing industry that have metal machining as an in-house process, such as companies in the precision engineering, aerospace, automotive and electronics sectors

Why This Course

On completion of this unit, participants will have the knowledge and application skills required to improve machining productivity through dynamics analysis and simulation. These skills include:

- Performing virtual machining simulation
- Validating NC code before real machining
- Reducing operation errors and enhancing safety using virtual CNC training
- Identifying the causes of a machining chatter
- Selecting a right cutting tool for minimisation of machining vibration
- Analysing the dynamic characteristics of toolings using modal tests
- Identifying characteristics of workpiece material that affect machining chatter
- Analysing machining stability lobes to prevent machining chatter
- Configuring the procedure for using a machining dynamic toolkit for optimising a machining process
- Analysing machining units and generating stability lobes using a machining dynamics toolkit
- Developing dynamics databases of machine tools and toolings for high productivity
- Demonstrating how to improve material removal rate using dynamics analysis and stability lobe
- Demonstrating the methodology for improving machining processes with high productivity using a machining dynamics toolkit

What You Will Learn

This course module aims at providing participants with practical and systematic training in machining dynamics analysis and simulation technologies that can be used to achieve high productivity with good surface quality, high geometrical accuracy, and high efficiency. The program scope covers virtual machining simulations, CNC verification, virtual training labs, fundamentals of machining dynamics, influences of tooling's geometry on machining stability, dynamics analysis of machining units, dynamics characteristics of work material, generation of machining stability lobes, operation of machining dynamics toolkit, know-how to improve material removal rate, and how to improve machining productivity using dynamics toolkit. Real case studies and demonstrations will be performed at each participant's shopfloor, showcasing productivity improvements on actual products in various machine tool structures.

About the Course Leaders

Dr Ko Jeong Hoon is a scientist with SIMTech and an expert in machining dynamics and mechanics, tooling optimisation, machine tool vibration, feed rate scheduling, and ultrasonic vibration milling. Having achieved academic and industrial R&D successes across Singapore, Canada, Germany and South Korea, he has developed a quick milling and turning vibration solver and optimiser that can help engineers improve machining productivity. Dr Ko has trained engineers from more than twenty companies on the application of machining dynamics to improve machining productivity.

Mr Liu Peiling has been a CAD/CAM researcher and developer for thirty years. His research interests include geometry modelling, 3D NC tool path generation, high speed-machining simulation, CAM optimisation, and tooling design application. With two patents in geometrical representation and mould cavity design method, his developments like the QuickMold, Inventor Tooling, QuickSeeNC, QuickCNC and VaneAdviser have been implemented worldwide. SPETA and ITE implemented Virtual CNC Training Lab that replaced real machine for training, which has been highly praised by MTI.

When and Where

• Please visit our website at **KTO.SIMTech.a-star.edu.sg** for the updated course schedules.

• Training Venue   :   Singapore Institute of Manufacturing Technology
73 Nanyang Drive, SIMTech Valley Block, Singapore 637662
**On-site testing is performed at each participant's company

Course Fee

• The fee for this module is S$4,500 before WDA funding and GST.
• All Singaporeans and Permanent Residents aged 21 years and above can enjoy WDA funding of up to **70%** of the course fee.
• Singaporean or Permanent Resident employees fully sponsored by SMEs can enjoy WDA funding support of up to **90%** of the course fee under the **Enhanced Training Support for Small & Medium Enterprises (SMEs)** scheme, subjected to eligibility criteria.
• Singaporeans aged 40 years and above can enjoy WDA funding of up to **90%** of the course fee under the **SkillsFuture Mid-career Enhanced Subsidy.**
• Singaporeans aged 35 years and above with earnings not more than S$1,900 per month can enjoy WDA funding for **95%** of the course fee under the **Workfare Training Support (WTS)** scheme.
• Singaporeans aged 25 years old and above are eligible for **SkillsFuture Credit** which can be used to offset course fees.

For more information about the course fee funding, please visit **www.wda.gov.sg**

Developed by:

SIMTech

Funding agency:

WDA
singapore
workforce
development
agency