國際競爭重點領域－智慧製造與創新管理中心

A Major Field of International Competition: Center for Smart Manufacturing and Innovation Management

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Project summary:

This project aims to establish the "Center for Smart Manufacturing and Innovation Management" and plan, research and develop, deepen, and implement relevant methods/models/technologies for the four major themes in this field: "planning and implementing technologies for smart manufacturing," "big data and decision-making optimization," "human–machine interfaces and user experience optimization," and "intellectual property/R&D management and service innovation." Focusing on the smart manufacturing topics of the industry, this project will develop automated decision-making methods for smart machine operation and user operation/decision-making support systems for smart factories through planning and implementing technologies for smart manufacturing so as to create a smart manufacturing environment for continuous quality improvement. At the same time, this project will also focus on the intelligent R&D and innovation topics of the industry. It will develop technologies such as manufacturing resource allocation and optimization via technology strategy optimization and R&D technology innovation, analyze R&D trends in smart manufacturing, arrange key intellectual properties, and formulate innovative service models so that the industry chain of smart manufacturing can take advantage of the global arrangement of intellectual properties and seize the market niche. Most project team members have participated in implementing the "Advanced Manufacturing and Service Center" subsidized by the Ministry of Education's "Aim for the Top University Project," playing a leading role. This means that the team members have built a tacit understanding through research integration and cooperation. The center is the only manufacturing management center supported by the Ministry of Education's "Aim for the Top University Project," and the university it belongs to is the only university in Taiwan that is ranked among the top 100 universities in the QS World University Rankings by Subject (Statistics and Operational Research). Therefore, based on the existing foundation, this project expects to continuously develop in this major field, strengthen international competitiveness, and improve global subject rankings. In addition, through this project, the center not only continues to deepen the cultivation of qualified people but also provides more advanced and effective methods and technologies for the industry in the field of smart manufacturing and innovation management, which helps to accelerate industrial upgrading.

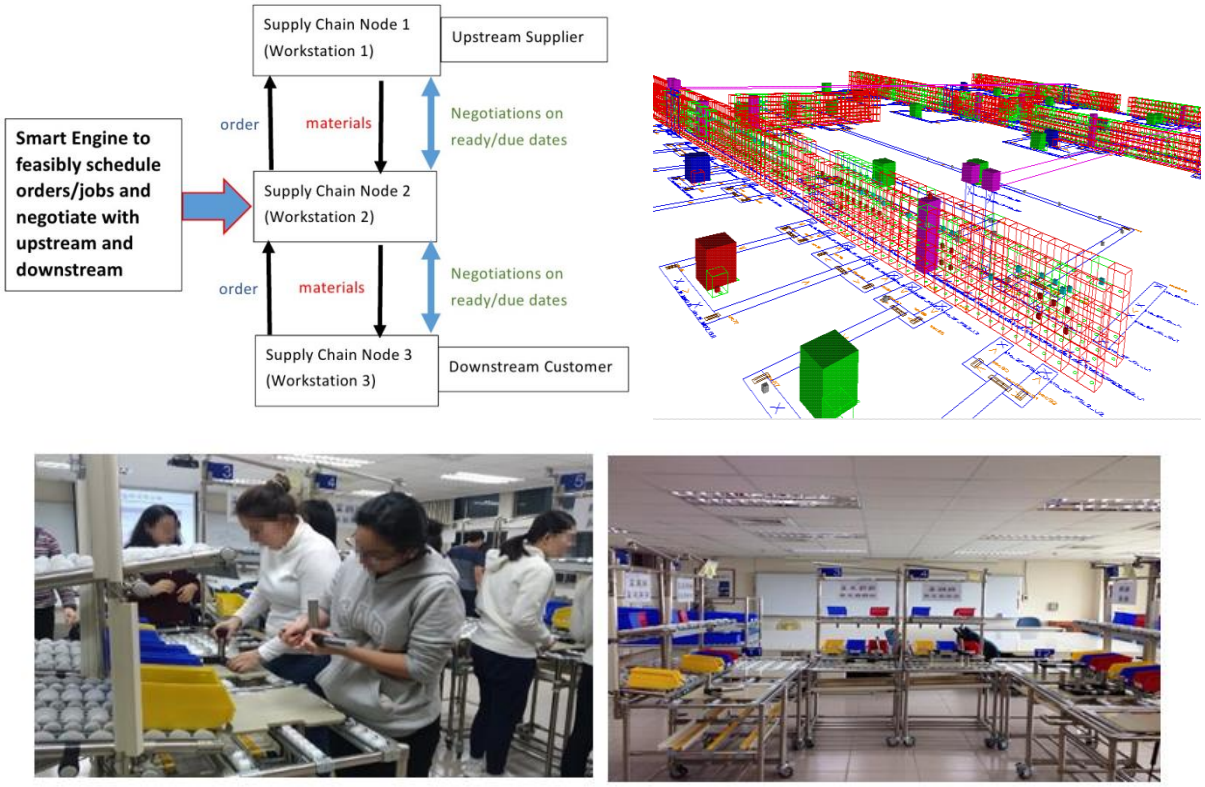

Figure 1. Advanced Manufacturing Planning: Related Methodology and Application

Advanced Planning and Scheduling (APS) is critical in smart manufacturing. Figure 1 shows an example of planning and scheduling mechanism in the negotiation of required capacity of customer orders with expected due dates and available capacity provided by the workstations in the supply chain nodes. Simulation model can be developed to evaluate the performance of APS and confirm its excellence before implementing it on the shop floor.

Students design ergonomic studies by conducting several devices to collect data for deciphering human performances. Equipments in Figure 2 including (1) Foot pressure mat (Fscan), (2) Force platform, (3) Eye tracker, (4) Motion capture camera, (5) Motion analysis software, (6) EEG, and (7) Surface EMG. After the experiments, students would learn the following knowledge: Gait biomechanics, Experimental settings, Signal processing and Data analysis.

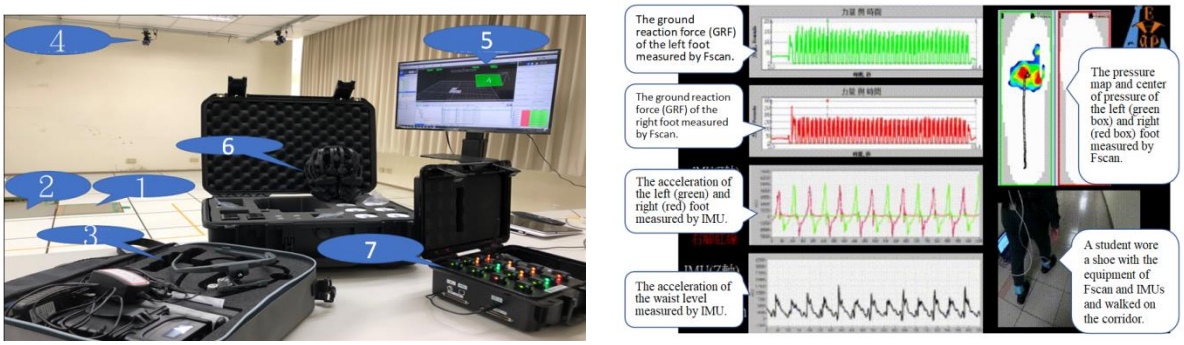

Figure 2. Equipments for ergonomic studies and human–machine interfaces.