

### (一)中文摘要。

本產學計畫主要是積層製造技術應用於產業界數位科技之教材發展與學習成效，透過系統方式，開發關於積層製造之課程內容，已提供給學校學生及產業界培訓積層技術能力所使用。本研究計畫預計邀請從事生產積層製造機器之廠商與中部地區設置有製造實驗室或科技教育中心之高中職與國中小之教師與工作同仁一同參與本研究之執行。研究期初擬先對於積層製造技術應有之技能與內涵進行專家研擬，進行發展能力指標。其次，再以召開專家會議方式確認能力指標內容，並依照能力指標內容進行數位製造之課程發展，並研擬課程所需之相關量表，所發展之量表內容有，學習成就量表、學習態度量表、教材評估量表。規劃積層製造之培訓實體課程與線上學習平台。同時檢核積層製造之教學大綱與教學單元模組之預試後修正教學所發現之缺失，並進行修正。實施現場教學與線上試教及學習成效評量，最後再將教材教法進行成效評估，並針對相關議題進行期刊論文與研究報告之撰寫。

關鍵詞：積層製造技術、3D列印、數位科技、教材發展、學習成效

### (二)英文摘要。

This industry-academic project is mainly about the development of teaching materials and learning effects of the application of multilayer manufacturing technology to digital technology in the industry. Through the systematic method, the curriculum content on multilayer manufacturing has been developed, and it has been provided to school students and the industry to train the technology capabilities of the industry. This research project is expected to invite teachers and colleagues from high school vocational and elementary schools with manufacturing laboratories or technology education centers in the central region that are engaged in the production of layered manufacturing machines to participate in the implementation of this research. At the beginning of the research period, it is planned to conduct expert research on the necessary skills and connotation of layered manufacturing technology, and carry out the development of capability indicators. Secondly, confirm the content of the ability index by convening an expert meeting, carry out the curriculum development of digital manufacturing according to the content of the ability index, and develop the related scales required for the curriculum. The contents of the scales developed include the learning achievement scale and learning Attitude scale, and textbook evaluation scale. Planning physical training courses and online learning platforms for multi-layer manufacturing. At the same time, check the syllabus of multi-layer manufacturing and the pre-test of the teaching unit module to correct the defects found in the teaching, and make corrections. Implement on-site teaching, online trial teaching and evaluation of learning effectiveness, and finally evaluate the effectiveness of teaching materials and methods, and write journal papers and research reports on related topics.

Keywords: Additive manufacturing technology、3D printing、Digital technology、Teaching materials development、Learning effectiveness.

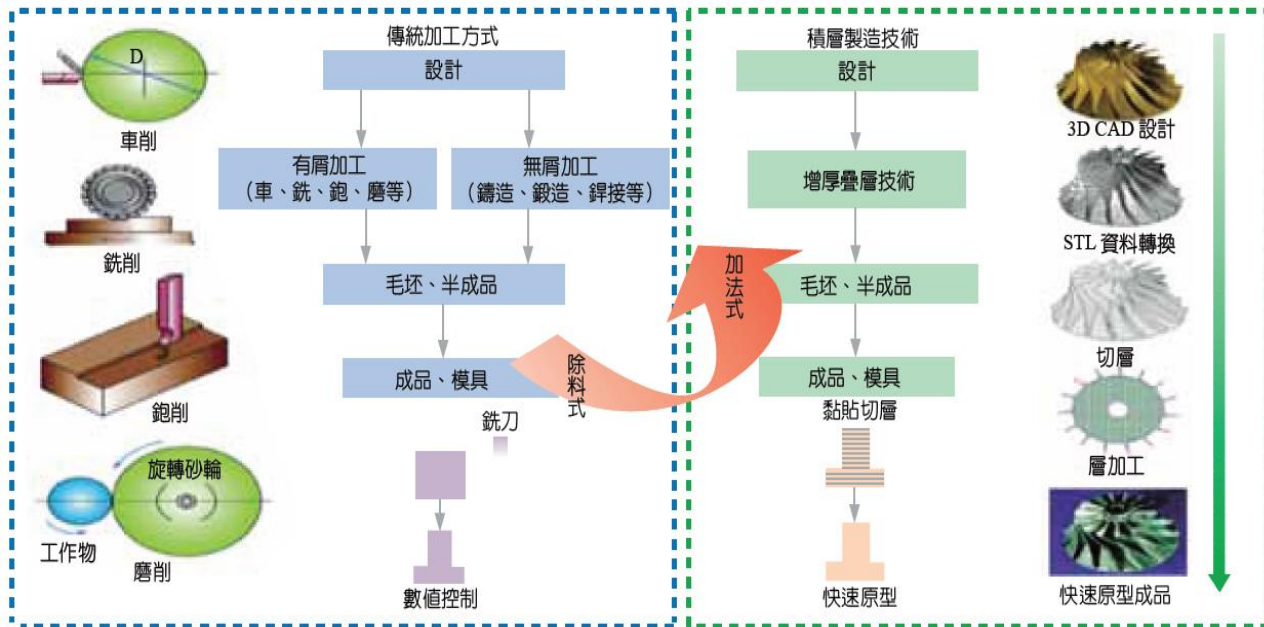


圖 1 積層製造與傳統加工之差異性

資料來源：積層製造研發布局與策略，工業技術研究院產業經濟與趨勢研究中心，2014。