2、成果开始和完成支撑材料

2.1、成果开始支撑材料

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Improving Industrial Production Process using computer technology: *An Interdisciplinary Curriculum*

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***Abstract*: With the recent advancement of science and technology, the modern industry-oriented competency requirements in mechanical engineering demand higher education for essential computer based knowledge. Production processes in modern factories these days, for example, mostly are controlled and operated by computers but current mechanical engineering curriculum doesn't provide such knowledge. In this paper, we proposed an interdisciplinary curriculum that is designed for undergraduate mechanical engineering major students so they may meet the competency requirements for the industry. An ideal industrial production process management method, where computer networking and cloud computing concepts are considered in the design, was proposed to illustrate such needs. The proposed method is designed to solve the problems that the modern production industries are experiencing. The proposed curriculum is designed to provide such computer knowledge to the mechanical engineering major students, which attempts to satisfy the modern industry-oriented competency requirements.**

Keywords*— *Computer network, mechanical engineering, production process management model, interdisciplinary mechanical engineering curriculum

I. INTRODUCTION

As the complexity and scope of technology grow, so is the industry's expectation for each and every technological domain such as mechanical engineering. With one discipline alone, such complexity may not have adequate solutions. To cope with such trend, it is increasingly common to have multidisciplinary solutions. For such reason, interdisciplinary methodologies and their applications are gaining popularity these days. Some of the popular interdisciplinary areas are medicine and biology, biology and mechanics, electrical engineering and mechanical engineering[1], interdisciplinary collaborative learning [2,3], collaborative teaching and learning[4], curriculum integration on art and literature and technology[5], and etc. It shows that the interdisciplinary approach is increasingly common and the demands for the technicians with interdisciplinary education are coming from various sectors of the society [6]. Some of the emerging subjects are biological medicine, biological mechanics, mechanical design for manufacturing, mechatronics engineering, and etc. In this paper, we are focusing mainly on the design of interdisciplinary curriculum on computer and information science technology and mechanical engineering. It aims to provide undergraduate students majoring in mechanical engineering in designing manufacturing and its automation processes with the understanding of computer related issues in the design.

II. BACKGROUND AND RELATED WORK

Historically speaking, mechanical engineering plays one of the key roles in the development of the national economy of any industrialized country. However, the demands to handle the issues with ever-increased complexity from the industry force mechanical engineers turn their eyes to the computers, which motivate the development of multidisciplinary education based on mechanical engineering and computer science. The addition of computer and information science related courses to mechanical engineering curriculum would help mechanical engineering major students understand computer-related aspects of the mechanical design so they may be able to solve more problems with complexity. The issue is how much and what level of computer knowledge a mechanical engineer should have in order to reach the level where it is useful in the field.

When computers were introduced to industry first time, mechanical engineering became one of the early adopters. Computer Integrated Manufacturing (CIM), for example, is one of the areas [7,8], where scholars began to study how to integrated the computer technology into the design of manufacturing and their processes to make it better. It has been recognized as the goal for future factory automation strategies to make manufacturing more efficient and competitive [9].

In the CIM system, the integration of computer aided design (CAD) and computer aided manufacturing (CAM) is essential, especially in a concurrent engineering environment. Since Niebel first discussed the use of computer to assist process planning tasks [10], nearly 50 years have elapsed. So far, CAD system has been used widely in the design process of mechanical products and became an essential design tool. Three-dimensional CAD system gave more expressive power to the design. Computer aided engineering (CAE) can also help solve various engineering problems. It is well known that the application of CAD system makes the resulting products

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2.2 成果完成支撑材料

机械设计制造及其自动化专业2016级课程设置和学习方式计划表

学期	模块属性	模块学分合计	课程代码	课程名称	考试/考查	比例		学分	总学时	共同学习学时	自主学习学时	课程总周数
						过程70-80%	期末20-30%					
一	通识必修	13	TS000101	自我管理	考查	100%		3	75	32	43	16
			DY000101	大学英语1	考试	80%	20%	5	125	48	77	16
			TY000101	体育1	考查	100%		1	80	80	不限定	16
			TY000105	体验教育	考查	100%		1	25	12	13	1
			XG000101	国防教育	考查	100%		2	2周	80	不限定	2
			TS000102	耿丹探究	考查	100%		1	25	12	13	6
	专业核心	19	ZN011001	机械制图	考试	70%	30%	4	100	80	20	16
			ZN011002	力学基础（包含流体和热力学）	考试	70%	30%	3	75	48	27	16
			ZN011003	电工电子基础	考试	70%	30%	4	100	80	20	16
			SL111101	高等数学1	考试	50%	50%	5	125	80	45	16
			SL111102	大学物理（机制）	考试	70%	30%	3	75	48	27	16
二	通识必修	10	SZ000101	中国现代化进程	考查	70%	30%	3	75	32	43	16
			DY000103	大学英语2	考试	80%	20%	5	125	48	77	16
			TY000102	体育2（晨练）	考查	100%		1	80	80	不限定	16
			XG000102	公共与公益服务（前三年）	考查	100%		1	25		25	
	专业核心	21	ZN101004	机械制图II	考试	70%	30%	3	75	48	27	16
			ZN101005	机械原理	考试	70%	30%	3	75	48	27	16
			ZN101006	材料力学	考试	70%	30%	3	75	48	27	16
			SL111106	高等数学2	考试	50%	50%	5	125	80	45	16
			ZN101008	金工实习I	考察	70%	30%	1	25	16	9	4
			ZN101009	工程材料	考试	70%	30%	3	75	48	27	16
			ZN101010	控制工程基础	考试	70%	30%	3	75	48	27	16
三	通识必修	10	SX000102	思想道德修养与法律基础	考试	70%	30%	3	75	32	43	16
			DY000103	大学英语3	考试	80%	20%	5	125	48	77	16
			TY000103	体育3	考查	100%		2	64	32	32	16
	专业核心	21	ZN011011	产品二维设计	考察	70%	30%	3	75	32	43	16
			ZN011012	机械设计	考试	70%	30%	4	100	64	36	16
			ZN011013	传感器与测试技术	考试	70%	30%	3	75	48	27	16
			ZN011014	机械制造技术基础	考试	70%	30%	4	100	64	25	16
			ZN011015	液压与气动技术	考试	70%	30%	3	75	32	43	16
			SL111107	线性代数	考查	50%	50%	3	75	48	27	16
			ZN011017	金工实习II	考察	70%	30%	1	25	16	9	4
四	通识必修	7	DY000104	大学英语4	考试	80%	20%	5	125	48	77	16
			TY000104	体育4	考查	100%		2	64	32	32	16
	专业核心	19	ZN011018	三维建模	考试	70%	30%	3	75	48	27	16
			ZN011019	机械产品设计	考试	70%	30%	4	100	64	36	16
			ZN011020	数控制造技术基础	考试	70%	30%	3	75	48	27	16
			ZN011021	机床电气控制	考试	70%	30%	4	100	64	36	16
			SL221108	概率与数理统计	考查	70%	30%	3	75	48	27	16
			ZN011023	金工实习III	考察	100%		2	50	48	2	16

机械设计制造及其自动化专业2016级课程设置和学习方式计划表

学期	模块属性	模块学分合计	课程代码	课程名称	考试/考查	比例		学分	总学时	共同学习学时	自主学习学时	课程总周数
						过程70-80%	期末20-30%					
五	认知实习	6	JX011458	认知实习				6	150			
六	通识必修	3	SZ000106	马克思主义基本原理	考试	70%	30%	3	75	32	43	16
	专业拓展一期(机器人方向)	21	ZN012001	机器人技术I	考试	70%	30%	4	100	48	52	16
			ZN012002	C语言及其应用	考试	70%	30%	4	100	48	52	16
			ZN012003	现代机械设计方法	考试	70%	30%	3	75	32	68	16
			ZN012004	机电企业管理导论	考试	70%	30%	3	75	32	68	16
			ZN012005	计算机仿真技术I	考查	70%	30%	4	100	48	52	16
			ZN012006	计算机辅助设计与制造	考试	70%	30%	3	75	32	43	16
	专业拓展一期（智能设计及制造技术）	21	ZN012008	产品设计与建模	考试	70%	30%	4	100	48	52	16
			ZN012009	产品 3D打印	考试	70%	30%	4	100	48	52	16
			ZN012003	现代机械设计方法	考试	70%	30%	3	75	32	68	16
			ZN012004	机电企业管理导论	考试	70%	30%	3	75	32	68	16
			ZN012005	计算机仿真技术I	考查	70%	30%	4	100	48	68	16
			ZN012006	计算机辅助设计与制造	考试	70%	30%	3	75	32	43	16
七	通识必修	5	SZ000107	毛泽东思想和中国特色社会主义理论体系概论	考试	70%	30%	5	125	48	77	16
	专业拓展二期(机器人方向)	23	ZN012010	网络应用技术	考试	70%	30%	7	125	48	77	16
			ZN012012	机器人技术II	考试	70%	30%	8	200	96	104	16
			ZN012013	计算机仿真技术II	考查	70%	30%	4	100	32	68	16
			ZN012018	控制技术应用	考试	70%	30%	4	100	48	52	16
	专业拓展二期（智能设计及制造技术）	23	ZN012019	夹具课程设计	考查	70%	30%	6	150	64	104	16
			ZN012016	产品制造与装配技术	考查	70%	30%	9	225	80	179	16
			ZN012013	计算机仿真技术II	考查	70%	30%	4	100	32	68	16
			ZN012018	控制技术应用	考试	70%	30%	4	100	48	52	16
八	专业实习	6	ZN014001	专业实习	考查			6	150			
九	通识必修	1	JY001309	大学生就业指导理论与实践	考查	70%	30%	1	25	16	9	8
		2	SZ000111	形势与政策	考查	80%	20%	2	耿丹名师大讲堂思政讲座			
	专业拓展二期（机器人方向）	17	ZN012017	机器人设计与制作	考查	100%		11	250	128	122	16
			ZN012018	机电产品营销	考查	70%	30%	3	75	32	43	16
			ZN012019	机电商务礼仪	考查	70%	30%	3	75	32	43	16
	专业拓展三期（智能设计及制造技术）	17	ZN012020	3D打印机的设计与制造	考查	100%		11	250	128	122	16
			ZN012021	机电产品营销	考查	70%	30%	3	75	32	43	16
			ZN012022	机电商务礼仪	考查	70%	30%	3	75	32	43	16
十	专业拓展四期	8	ZN012020	毕业实习	考查	100%		8	200			
		12	ZN012025	毕业设计（论文）				12	300	16	284	