

# Integration Model Based on the Integration of “CAD/CAPP/PLM/ERP” Framework Research

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For discrete manufacturers mainline business processes and core business data of the sort, based on workflow and integrated management of the dominant ideology, given the kind of enterprise information system integration of basic principles; On this basis, proposed based on “CAD / CAPP / PLM / ERP” integrated model integration framework to study the integration logic and data model: given based on “unity underlying database” integration platform, to achieve a seamless integration between the various subsystems. You can solve the underlying data integration system can not automatically obtain and pass, the main line of business issues such as cardiopulmonary bypass and information silos, improve the efficiency of the system, operating results and reliability, to provide technical support for the planning and implementation of enterprise information.

## 1. Introduction

Li (2005) reported, many manufacturing companies can not integrate between systems, information silos widespread, causing a lot of information needs to repeat input, greatly reducing the efficiency of information systems, severely restricted the play to the overall effectiveness of the enterprise information system. At present, China has entered the “two deep integration” of deep water. Wu and Shi (2009) reported, how to network interconnection, data sharing, application integration and process of convergence of information resources will be distributed in a separate comprehensive integration of various departments as a whole, through the utilization of the information advantage into decision superiority, it has become a key element to enhance their core competitiveness. Although the foreign system integration research rich, but not suited to the domestic enterprise management; domestic lack of systematic research, can not meet the domestic enterprise information urgent need:

### 1.1. On systems integration framework

Amber Computer System Inc. (1995) reported “In ERP, MRPII as the core of enterprise management”. It laid the foundation of information technology architecture of different types of production enterprises, a mature application experience. Bellabdaoui A, Fiordaliso A and Teghem J (2005) reported One kind of using “Event” mode discrete and continuous two kinds of process integration framework model; Groover (1987), Wang (2005) and Dursun D (2003) reported System architecture for the system life cycle system architecture for system functions and control structures constitute oriented system architecture and integration platform; In addition, from the perspective of different research presented research results, Including: Abdmouleh A (2004) reported system architecture of distributed C / S structure, Geert Poels (2003) reported object-oriented system architecture, David A (2001) reported supply chain based system architecture, Narendra N C (2004), Vonk (2003) and Salimifard K (2001) reported workflow-oriented system architecture. The “to ERP, MRPII as the core of enterprise management mode” manufacturing enterprises at home and abroad widely used model, this country is known as “financial - business integration” integrated framework because they do not meet the domestic enterprises operating mode, resulting in a lot of information silos and duplication of data entry and widely criticized. Dong (2010) and Yang (2004) the study mainly under foreign mature technology framework to systematically investigate cell technology application strategy. At present, both at home and abroad in the common interest to ERP as the core of a wider range of unit system integration mode, ie CAD / CAPP / PLM /

ERP integration framework, Xu (2011) reported PDM/CAX integrated model Integrated mode and PLM / CAPP / ERP system. But integration framework and business processes, internal relationship business data (that is, "the integration logic") research rarely, not a good guide enterprises to make effective integration plan, which is currently a lot of enterprise information systems exist "message island" and "mainline business pump" roots.

### 1.2. About information integration

Wu (2007) reported proposed using BOM integrated system as an integrated mode main information; Tian (2002), Wang (2009), Chen (2009) and Xu (2012) reported for CAD / CAPP / PDM / ERP integration issues, given the BOM as the ideological basis for integrated data model. This kind of integration patterns as the main line of BOM information has been widely used at home and abroad, but rarely integrated environment under the relevant BOM acquisition and transmission of information, the basic data sharing research results. In the practice of enterprise information, the information lacks overall integration unified, efficient model, integrated environment ERP source data is not accurate, not the underlying data sharing and duplication of data entry problems are acute.

In the present study, for the issues raised above, given the discrete manufacturing enterprise information system integration of the fundamental principles of integration logic and data model based on "CAD / CAPP / PLM / ERP" integrated framework for integrated information system will be the systems studied, based on the "unity underlying database" based data sharing and automatically obtain and deliver ERP source data model based PLM platform.

## 2. The basic principles of integrated discrete manufacturing enterprise information system

### 2.1. Mainline business processes and core business data analysis

Enterprise management is essentially to promote business data between departments and job generating, processing and transmission of this information flow driven logistics and cash flow, the performance of the macro as business management process. As shown in Figure 1, several key service nodes constitute a discrete manufacturers closed loop main line of business, and promote the flow of core business data.

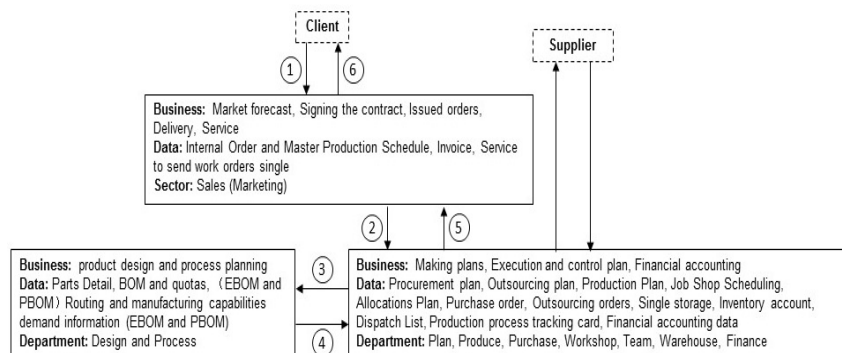


Figure 1: Discrete manufacturers mainline business processes and core business data

### 2.2. The basic principles of integrated discrete manufacturing enterprise information system

Li (2006) reported, according to the work flow leading principle, the need to manage information and workflow management effectively integrated to achieve a workflow-driven mode of operation and process management, Therefore, the information systems function is highly integrated with the main line of business processes to handle all core business is to achieve a "business without cardiopulmonary bypass" basis; Marchand, D (1995) reported, information resource management integration is to manage the integration of the core, capable of handling all the core business data, ensure data between the various positions according to management logic efficient, standardized and orderly flow of information is the system integration of the basic requirements, but it also solves the "islands of information" to ensure that the data is accurate, standardized and timely protection. Thus, it can work out the following basic principles of information systems integration:

(1) To achieve the overall coverage of the main line of business, forming a closed loop business to eliminate CPB main business processes: the integrated software framework for integrated planning, the sum of the function of each unit of the integrated system should be fully consistent with all the main process requirements, it can not be artificially separated overall business, but can not function vacancy occurs.

(2) Ensure dynamic data flow, information feedback loop, count one, the global share, to eliminate information silos: each data entry should be unique acquisition mode should be coordinated with the work flow; the underlying data need to be shared by professional job maintenance, unity storage, global shared, to eliminate duplication of data entry.

### 3. Based on the integration model "CAD / CAPP / PLM / ERP" framework

#### 3.1. Integrated software framework integrated model and integration logic

Based Software Architecture Integration Model "CAD / CAPP / PLM / ERP" framework and integration logic shown in Figure 2. The integrated model is still the core of ERP, which meet the needs of manufacturing enterprises. But with the "Finance - Business integration" integration model it is different, before the ERP adds CAD / CAPP system to complete the acquisition and processing of data and process design, and PLM (PDM) as a platform to achieve tight integration with the ERP.

Integrated logic integrated model is: CAD / CAPP system covering design and process operations, generating design and process data, solve the "what, how to make" issue; PLM (PDM) is an integrated platform for the integration of the integrated system, which will design and process data processing into MBOM, automatic transfer to the ERP system is the CAD / CAPP and ERP communication bridge; ERP system covering planning, production, outsourcing, sales and financial services, to solve the "manufacture what, what resources would be required what resources, on what plans to manufacture and implementation of the plan how to "questions.

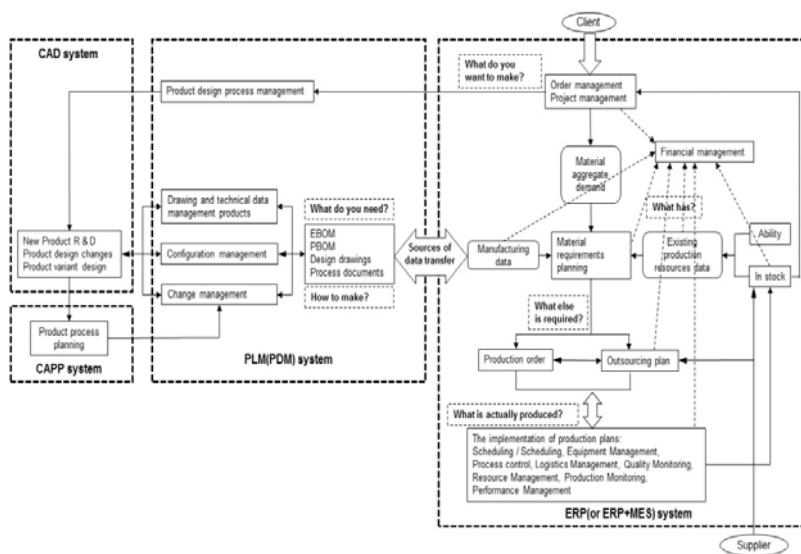


Figure 2: Integrated software framework integrated model and the integration logic

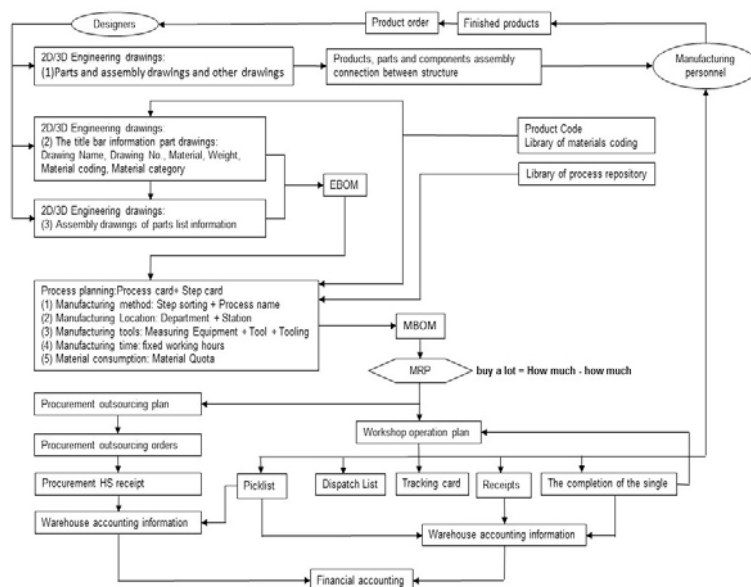


Figure 3: Based on the Integration of Data Model "CAD / CAPP / PLM / ERP" framework

### 3.2. Integrated data model integration

The data model is the route and business law information system data flows. According to the basic principles of information systems integration, integration model in an integrated software framework based on the combination of integrated logic model, the Integration may submit data model shown in Figure 3. The data model defines the structure and logic in conditions of informationization core business data and the underlying data. These data logic closely has not been split unit system traces seamlessly integrated model reflects the idea of integration, also in line with the actual management of the enterprise closely linked to the main line of business.

### 4. Sources of data sharing and integration of the integrated model of data transfer mode

The integrated principles proposed by the basic data unit responsible for maintaining the system must be implemented globally shared, in order to avoid duplicate data entry; BOM is an important link between the design department and manufacturing department of information communication, EBOM and PBOM must automatically be acquired, to automatically generate MBOM, passed to the ERP system as a source of data, which is the basis for the elimination of information silos. These two points are the integration of the integrated model to overcome the "Finance - Business integration" system defects important condition, but also reflect the information integration management. Zang (2011) reported, sharing information with integrated support platform middleware approach is one of the most advanced application systems integration approach, According to this principle, the Integration model "Delivering underlying database" strategy to achieve high degree of sharing of each unit of data; use PLM (PDM) as an integrated platform for two-way dynamic ERP source data is automatically passed. See Figure 4.

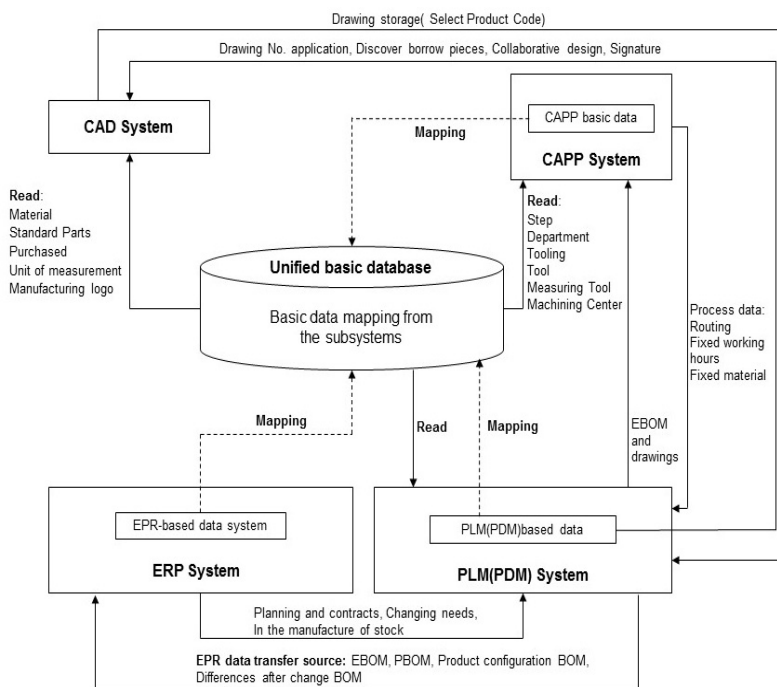


Figure 4: Sources of data sharing and integration of the integrated model of data transfer mode

#### 4.1. Basis of data sharing and information integration

##### 4.1.1 Business data flow

Staff positions in the natural way of working operating unit system functions, completing the generation and processing of their business data, to achieve the goal "business data in the correct location, in a natural way to generate and process, in the right way flow". Ensure data specification, timely and effective, eliminating information silos, duplication of data entry and data redundancy.

##### 4.1.2 Basic data sharing

To ensure professional and timely maintenance of basic data completed by different staff positions, and stored in the corresponding cell system (Table 1). The establishment of a unified basic database model in the Integration as a data sharing platform, the basic data of each unit can be mapped to achieve fast query

through this mechanism, each unit system can read data from other base unit system directly, to achieve real-time sharing, to achieve the goal "count one, high degree of sharing".

#### 4.2. ERP source data is automatically passed

Figure 4 shows, CAD, and CAPP system basis from the consolidated database and PLM (PDM) systems to obtain the basic data you need, at the operating design and technology staff, the completion of product design and process documentation drawn, again PLM (PDM) storage and archiving systems; PLM (PDM) systems can automatically generate EBOM and PBOM, automatic transfer to the ERP processed into MBOM later. It abandoned the hand-woven MBOM way fundamentally ERP source data to ensure accurate and timely, accurate preparation and flexibility to adjust to a variety of plans to lay the foundation.

Table 1: Model-based data integration system maintenance units and storage

Unit System	Basic data system maintenance and storage unit	Maintenance personnel
CAPP	Step coding, coding department, tooling, tools, measuring tools, machining centers encoding, typical crafts	Technology staff
PLM(PDM)	Drawing coding, product classification, product code, etc.	Designers
ERP	Material code, supplier data, customer data, units of measurement, manufacturing identification, warehouse coding	Design, financial and other management personnel

## 5. Conclusions

Based on the Integration Model "CAD / CAPP / PLM / ERP" framework to solve the "Finance - Business integration" model problems showed the following characteristics in the enterprise information construction practices:

(1) "CAD / CAPP / PLM / ERP" integrated framework to cover all main business discrete manufacturing enterprises, data models and integration with business logic running highly integrated, high degree of sharing of basic data, business data tightly integrated to form a closed loop business to eliminate the "islands of information" and the "main line of business bypass" phenomenon, to achieve a true integration of information systems and business management.

(2) PLM system as an integrated platform to achieve the two-way interconnection CAD / CAPP and ERP system to achieve automatic transfer source data aggregation and eliminate the manual preparation of BOM; completion of basic data shared database through a unified basis, to achieve a "number out of a global sharing" to ensure that the data specifications, complete, accurate and timely, eliminate redundancy and duplication of data entry.

Although based on the Integration Model "CAD / CAPP / PLM / ERP" framework adapted to the discrete manufacturing companies overall information needs, but there are "complex planning, investment, long implementation cycle," the risk, companies should try to upgrade information technology awareness, establish a standardized management system, in obtaining certain information on the basis of experience, taking strategies to avoid risks "the overall planning, step by step".

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