파라매트릭과 형상처리

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WG12 활 동 영 역

- Parametrics
- 통합자원:
  - 기본 통합자원: Part 41 ~ Part 49
  - 응용 통합자원: Part 101 ~ Part 107
- AIC: Part 501 ~ 518
- Florence meeting schedule
  - 10/20(월): Parametrics
  - 10/21(화): Parametrics Integration Workshop
  - 10/22(수): WG12 Plenary
  - 10/23(목): WG12 / Plib, QC Joint Meeting

WG12 활 동 영 역

- Short term issues
  - WG3 and WG12 relationship (integrated resources)
  - Interpretation procedures documents
  - SEDS process
    - QC comments into process
    - Open SEDS issues for issues for 41/43/44
  - Parametrics
    - Short term - 14959 or 10303
    - Long term - personnel resources
  - Plib relationship to WG12 common resources
  - Integration and data architecture, QC data engineering

WG12 활동 영역

- Long term issues
    - Consistent interpretation of IR/AIC
    - PWI and NWIs fit into SC4 structure (PPC or WG12)
    - Relation of modules to common resources (which WG has responsibility
    - Change management
    - Impact on common resources and/or degree of harmonization of other ISO standards

AIC 분야 활동

- **Wireframe:** Edge-based, Shell-based, Geometrically bounded 2D, Geometrically bounded
- **B-Rep:** Faceted, Elementary, Advanced
- **CSG**
- **Surface:** Geometrically bounded, Non-manifold, Manifold, Topologically bounded
- **Draughting:** Annotation, Drawing structure and administration, Elements
- **Mechanical design:** Context, Geometric representation, Shaded presentation

통합자원 분야 활동

- Version 2 preparation
  - Part 41, Part 43, Part 44: Minor change
  - Part 42: Minor change and New schema addition
  - 현 진행 자료는 SOLIS에 준비되어 있음
- Coordinator change
  - Part 47: Tolerances
- New part preparation
  - Part 106: Building core model
  - Part 107: Engineering analysis

Part 42 변경 내용

- Geometry schema
  - planar_swept_surface is introduced
  - polar_point, spherical_point, and cylindrical_point are added as subtypes of Cartesian_point
- Topology schema
- Geometric models schema
  - More CSG primitives: ellipsoid, tetrahedron, rectangular pyramid, reducing torus
  - swept_face_solid and swept_area_solid are introduced
  - Subtypes of geometric_representation_item
  - Subtype of solid_model: brep_2d

Part 42 변경 내용

- Mathematical representation schema (New)
  - Requested by engineering analysis society
  - Define a general, flexible, standard way of communicating engineering design and analysis data involving physical fields or configuration spaces of arbitrary dimensionality
  - Specifically, propose an EXPRESS schema containing fundamental entities needed to express mathematical spaces and the mathematical functions between them
  - Mathematical function, value, tuple, and space
  - Array function and matrix

Parametrics 그룹 활동

- Objectives
  - To provide an explicit geometric constraint modeling capability in STEP
  - To develop an architecture for the capture and exchange of hybrid product models, combining parametric with explicit aspects
  - To develop a larger architecture to encompass previous one together with evolutionary life-cycle information
- Related terminology
  - Constraint, constraint solver, generator, ripple effects
  - Over, under, or well constrained

Parametrics 그룹 활동

- History model issues
  - CAD system dependency of operations (commands)
  - Mixture of explicit and implicit constraints
  - Naming mechanism / indirect reference
  - Persistent naming
  - Active / inactive control of parts of an operation history
  - Variable declaration / value assignment mechanism
  - Mathematical expression among dimensions
  - Human readability of operation history
  - Need of neutral assembly model

Parametrics 그룹 활동

- 관련 Projects
  - ENGEN (Enabling Next Generation Mechanical Design) project: From Nov. 1995
    - www.scra.org/engen
  - OCAI (Open CAD Architecture for Interoperability) project: From Jan. 1997
    - www.ocai.org
  - QCIM (Quality Management by CIM) project (Germany)

ENGEN Project

- Participating organization
  - SCRA, Ford, CV, SDRC, PTC, ASU, Purdue, ITI,ADL
- Objective
  - Develop data model to capture design intent and evaluate the model via demonstration projects using Ford Motor Co. data and work process flow
- Milestones
  - Nov. 95 - Nov. 96: Data model
  - Apr. 96 - Jun. 97: Pilot demonstration
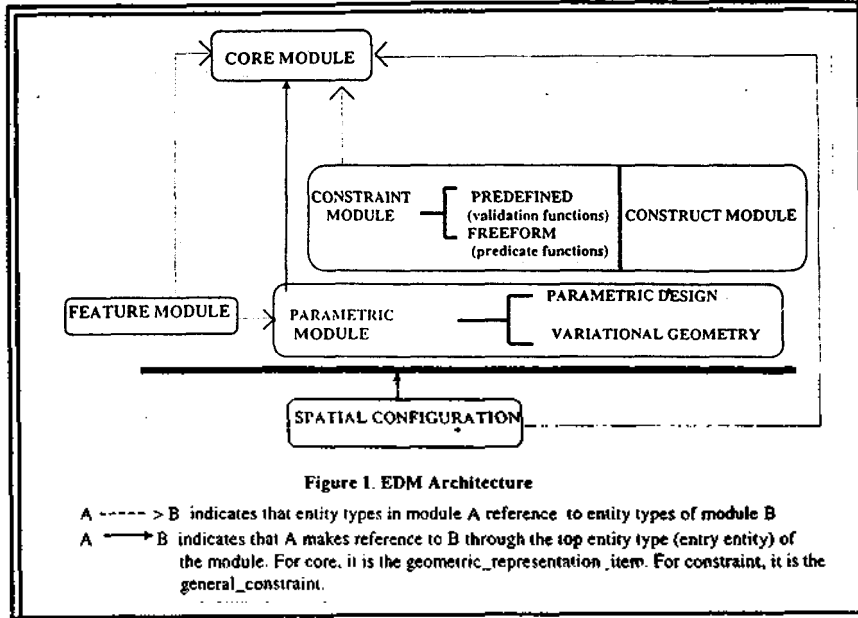 - Mar. 96 - Jun. 97: Infrastructure tool
  - Mar. 97 - Aug. 97: Case study

ENGEN Project

- Approach
  - Develop an associative data model capable of representing not only design geometry, but parameters, constraints, features and construction history
  - Using this neutral model, three different mechanical design system (CV, PTC, and SDRC) will exchange data to form an agile, integrated design environment
- ENGEN data model architecture: Fig. 1
- Types of constraint: Fig. 2
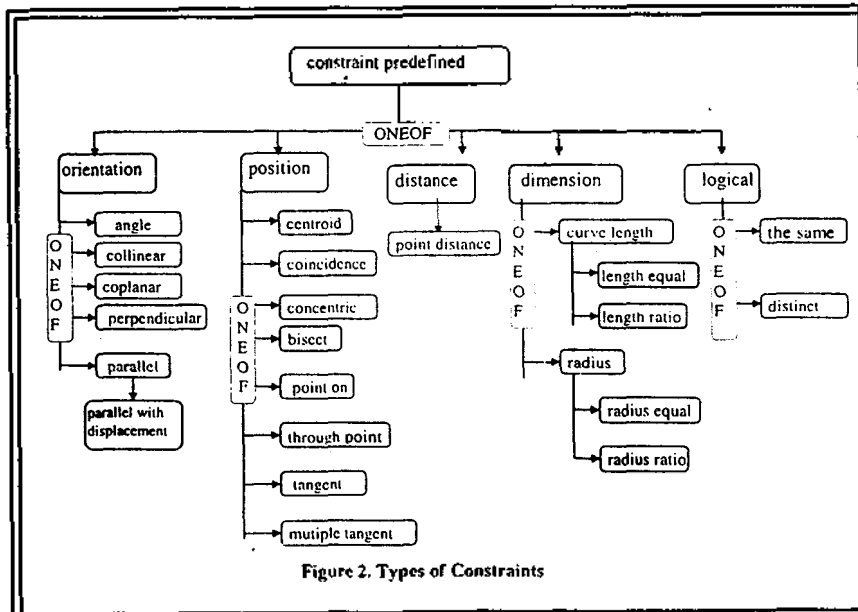- Architecture of feature model: Fig. 3

Figure 1. EDM Architecture

A ----- > B indicates that entity types in module A reference to entity types of module B
A ——→ B indicates that A makes reference to B through the top entity type (entry entity) of
the module. For core, it is the geometric_representation_item. For constraint, it is the
general_constraint.

Figure 2. Types of Constraints
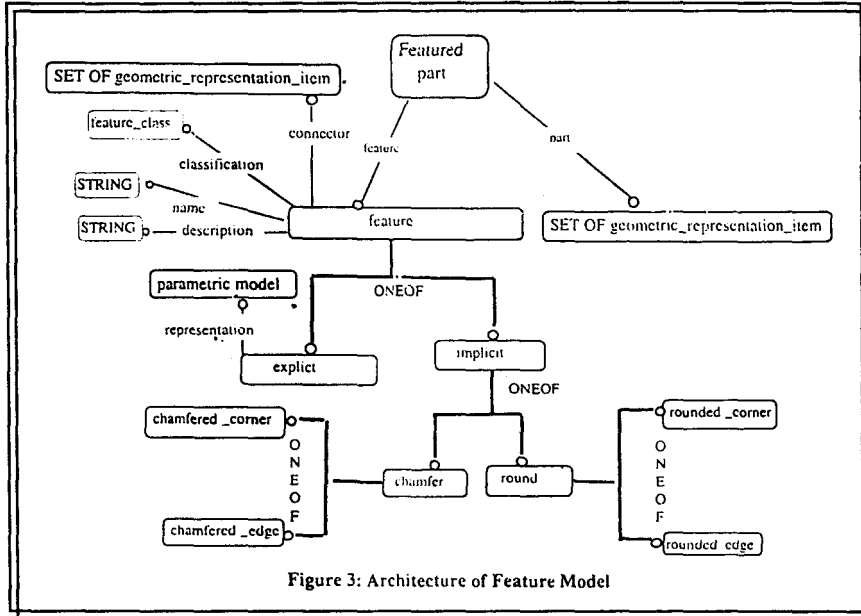
Figure 3: Architecture of Feature Model

OCAI Project

- Participating organization
  - AutoDesk, EDS/Unigraphics, Intergraph, SolidWorks, Meta-Datavision, SDRC
- Objective
  - Commercial availability of advanced feature and constraint based design environments supporting editability and independent of specific geometric modelers and user interface
- Starting date
  - Jan. 1997: No formal report yet

OCAI Project

- Approach
  - Feature-based models using a procedural approach based on Hoffmann's E-rep ideas
  - AP 224 will be adopted as the conceptual model for the data exchange
- Interface tool considered
  - OLE (Object Linking and Embedding) for D&M (Design and Modeling)
- Initial demo
  - Sep. 1997

결론

- 통합자원은 AP등 다른 분야에서의 요구에 따라 지속적인 개정 작업이 이루어지고 새로운 Part가 추가될 것임.
- AIC는 조만간 국제표준화가 완료될 것임. (현재 CD 문서에 대한 voting 중)
- Parametrics 그룹 활동은 STEP에 수용될 것임.
- Parametrics에는 history based model을 exchange 할 수 있는 data model이 채택될 것임.
- Parametrics는 곧 NWI으로 등록되어 개발의 속도가 빨라질 전망임.