

STEP 기반 자동차 PDM

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한국과학기술원
기계공학과
오유천

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ProSTEP
PDVS

www.prostep.org

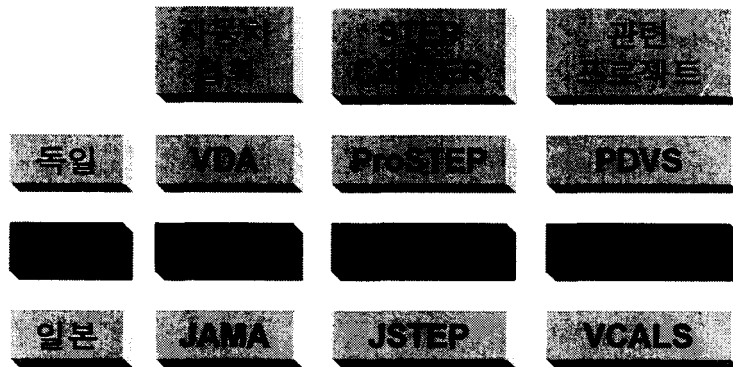
JSTEP

PDES, Inc.

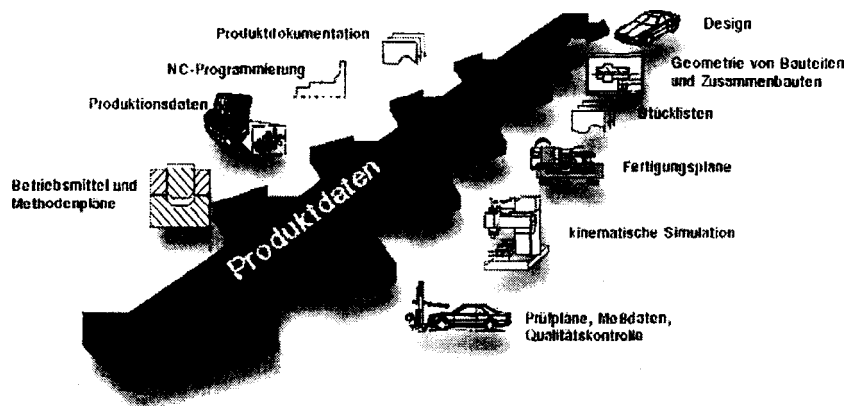
STEPnet



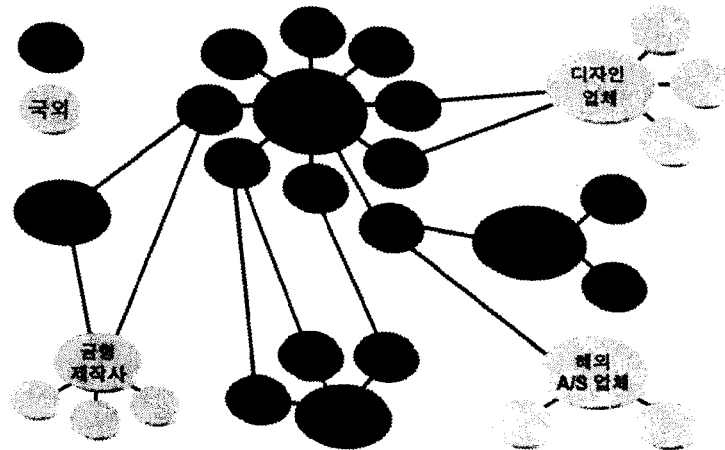
STEP 기반 자동차 PDM 관련 프로젝트



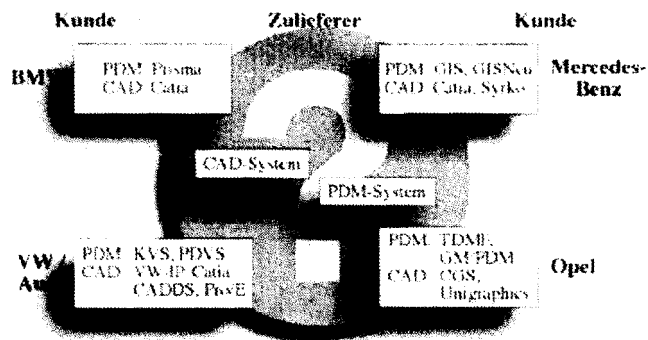
Process - STEP AP214



자동차 산업에서의 전형적인 가상 기업 환경

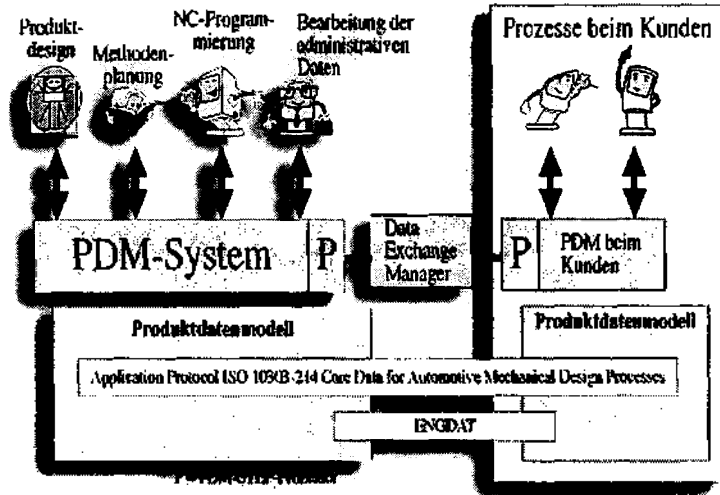


Problem - Heterogeneous System



900 manufacturers & suppliers : 110 different CAD systems

PDM

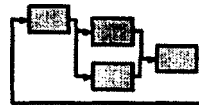


PDM Functions

Data Vault & Document Management



Workflow & Process Management



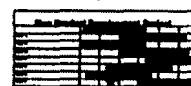
Product Structure Management



Part & Component Management

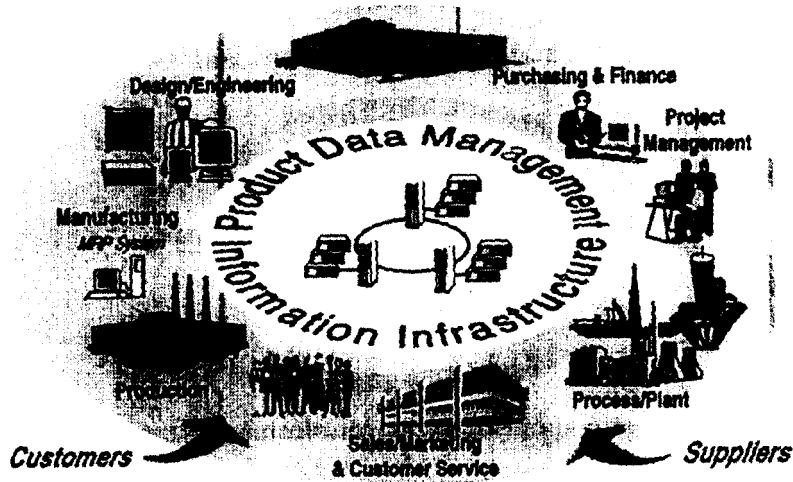


Program & Project Management



Utilities: communication and notification, data transport & translation, image services, administration

PDM Vision



ProSTEP



- ✓ <http://www.prostep.darmstadt.gmd.de>
- ✓ ProSTEP e.V.
- ✓ ProSTEP GmbH
- ✓ BMW, Bosch, Daimler Benz, Opel, Siemens, Volkswagen/Audi
- ✓ Project
 - PDMI - Product Data Modelling on the basis of International standards
 - PDVS - Produktdatenverwaltungssystem

PDVS Overview



- ✓ Produktdatenverwaltungssystem
- ✓ Prototype - development of a demonstrator for the product data management according to AP214
- ✓ Realize the concepts defined in AP214

- ✓ Customers : Audi, BMW, Benz, Porsch, Volkswagen
- ✓ Contractor : ProSTEP GmbH, debis Systemhaus Engineering GmbH, VW-Gedas mbH
- ✓ Project Leader : Dr.-Ing. B. Machner
 - E-mail : machner@prostep.darmstadt.gmd.de

Goal



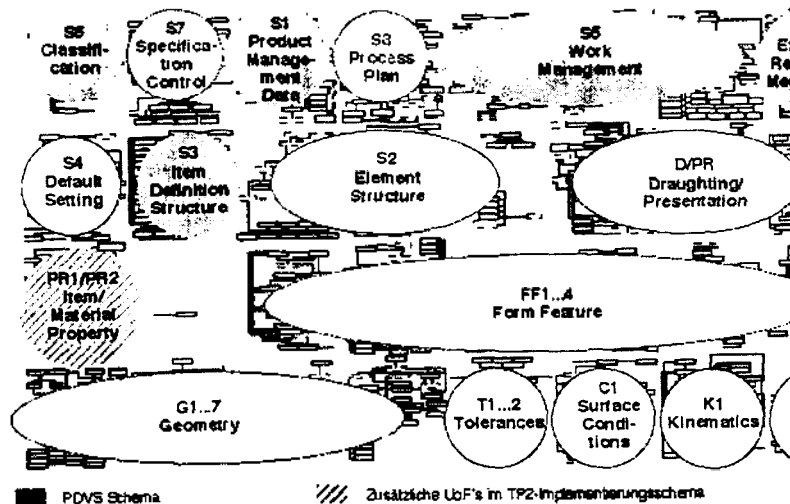
1. Prompt realization of a AP214-subset for assembly design
2. Geometry and item structure data
3. Improvement of the communication between designing Engineer and external partner
4. Interface towards selected CAD systems (CATIA, VW-IP)
5. Influencing of the product design of the EDM-and CAD/CAM system vendors
6. Usage and advancement of the STEP/PDMI-project results
7. Returning of the results to the STEP-standardization

Schema



- ✓ Implementation Schema : AP214 Subset
- ✓ It reflects the views of the applications described within the ARM of AP214
- ✓ It enables the bi-directional data mapping into and from the AIM representation
- ✓ Physical File (ISO 10303-21) and SDAI (ISO 10303-22)
- ✓ It is achieved by using only EXPRESS-constructs
- ✓ Supported Application Objects
 - approval, assembly_classification, date_and_person, external_description_with_coordinate_space, item, item_definition_relationship, item_version etc

AP214 Subset



Layers



- ✓ Presentation Layer
- ✓ Processing Layer
 - Business Object Layer
 - STEP/PDMI-Data-Access-Library (DAL)
- ✓ Data Storage Layer
 - STEP Data Access Interface (SDAI) in C++
 - Based on ORACLE, Object Store and PSstep_Caselib
- ✓ CAD-Interface
 - CATIA
 - another CAD-system is being prepared

User Interface & Functions



- ✓ User Interface
 - Part Editor
 - Assembly Editor
 - Structure Viewer
 - Document Manager
- ✓ Functions supported at the PDVS-kernel without CAD-interface
 - Creating, searching, updating and purging of items and item versions
 - Defining and updating of assembly structures
 - Graphical representation of the assembly structure and of the view
 - Creating, searching, updating and purging of documents

Part Editor



System Part Version View

Name	Part
Name	Part
Description	Part Tool

Version

Version Number	Description	Source

View

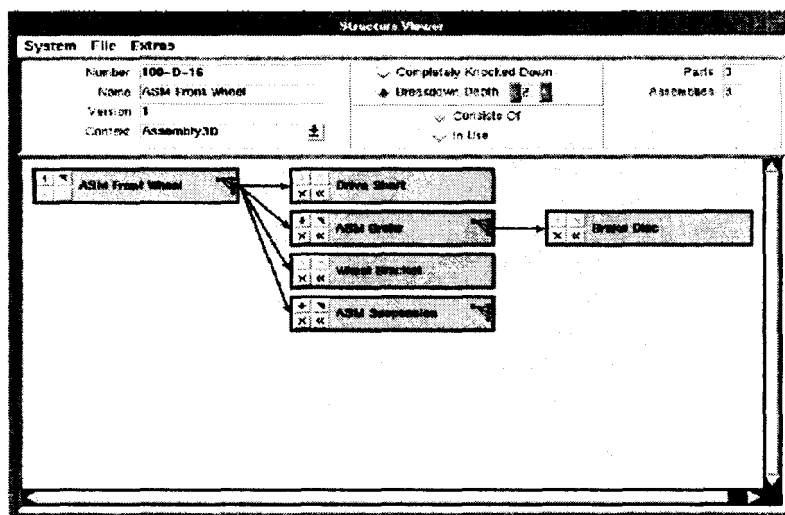
Context	Description

New View

Part	Version	View
Number	Version	View
Version Number		
Context	Description	

Done Cancel

Structure Viewer

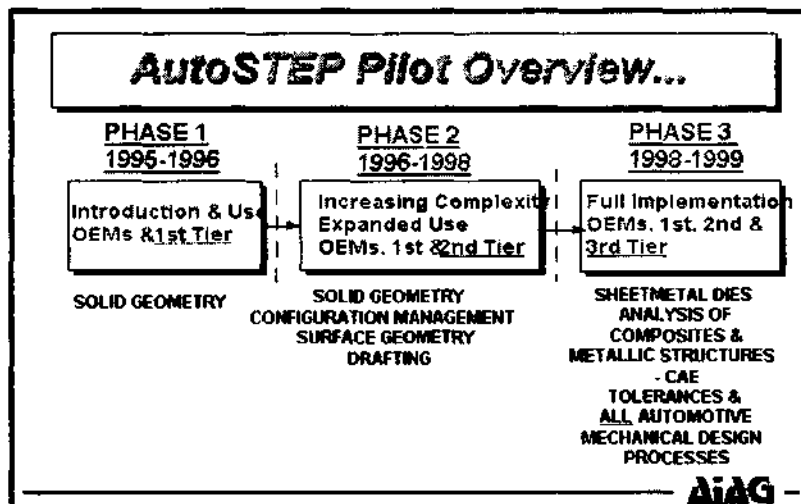


AutoSTEP Overview



- ✓ Goal : The efficient exchange of product data throughout a supply chain
- ✓ AIAG : Automotive Industry Action Group
 - <http://www.aiag.org/>
- ✓ AutoSTEP purpose ...
 - Introduce STEP to Automotive industry
 - Ensure STEP development incorporates needs of industry
 - Develop the business case for STEP
 - ...and improve product development process

Phases



Phases



✓ Phase 1 (completed in March of 1996)

- Commercially available STEP translators
- Test files were exchanged between trading partners.
- Major U.S. automakers and a few of their first-tier suppliers.

✓ Phase 2 (began in April of 1996)

- Increasing the number of companies involved at the manufacturer and first-tier supplier level as well as adding second-tier suppliers.
- Two defense-oriented supply chains were added, providing greater breadth.
- The kinds and complexity of information exchanged are being increased.

✓ Phase 3

- further extend the information and depth of the supply chains involved.
- Using broad capabilities of STEP to support most aspects of automotive mechanical design.

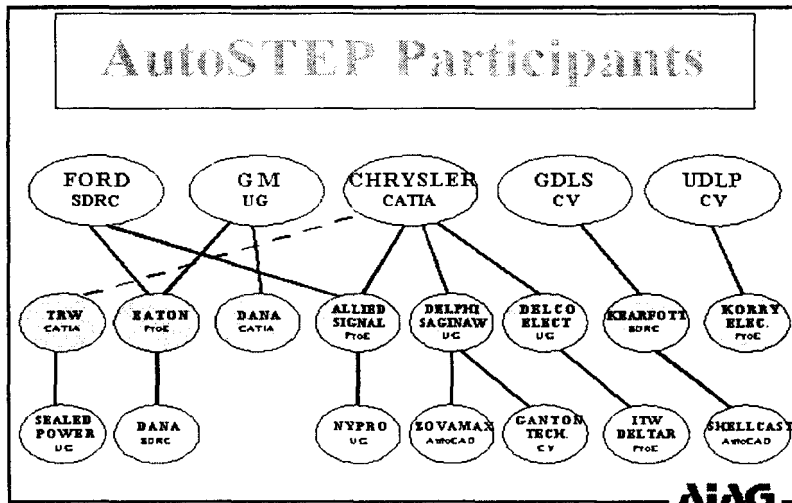
Approach



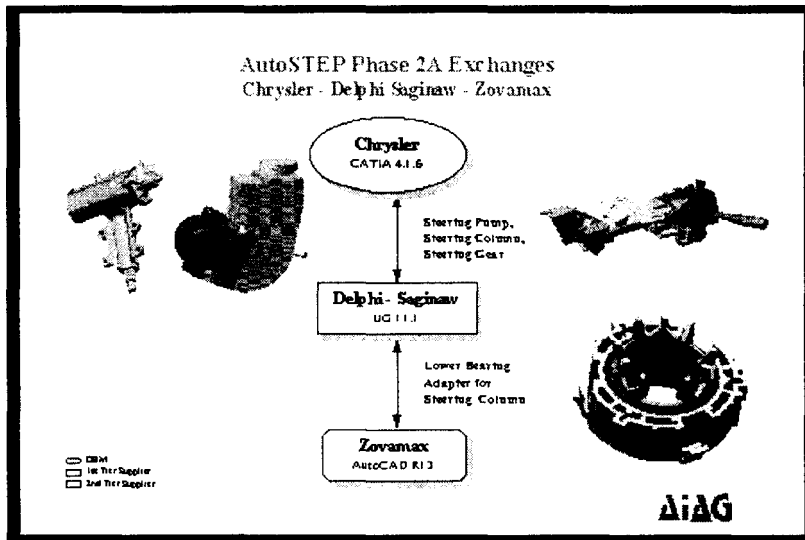
✓ Basic outline through the three phases

1. Demonstrate a particular STEP capability through the exchange of test data.
2. Document the business processes related to the exchange of product data for product and process design.
3. Identify opportunities for suppliers and their customers to take advantage of better product data exchange by improving the business processes supporting product and process design.
4. Use the demonstrated STEP capability and improved supporting business processes to exchange product data in support of new design projects.

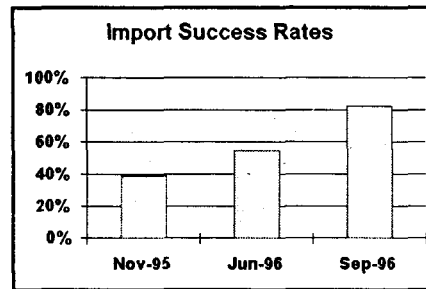
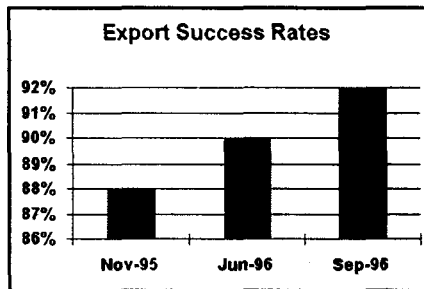
Participants



Pilot Translator Evaluation Results



Export/Import Success Rates



Benefits



- ✓ Demonstrating how automotive supply chains can *better integrate their product and process design activities*.
- ✓ The ability to exchange product models in an accurate, timely, and cost-effective manner will support concurrent engineering by *allowing much greater coordination between the diverse design activities* required for the development or redesign of a vehicle.
- ✓ The end result is a **shortening of the time required to bring a product to market**.
- ✓ Some other benefits of the AutoSTEP project are as follows:
 - Exposure of suppliers to STEP technology
 - Potential reduction in non value-added investments in multiple CAD systems
 - Significant improvement in product development quality, time to market & cost
 - Deployment of STEP technology throughout the automotive industry
 - Ability to integrate product and business data in the global marketplace

ISAP (International STEP Automotive Project)

✓ **Goal :** To exchange data between U.S. and European car manufacturers and a common suppliers using STEP.

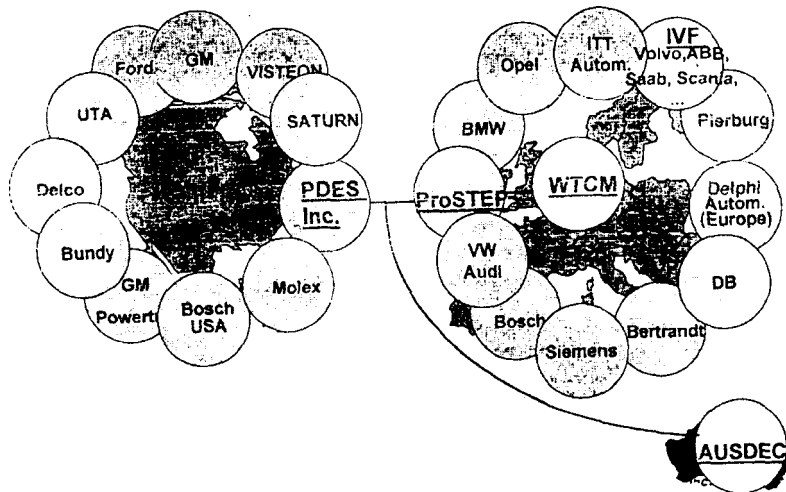
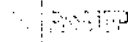
✓ Participants

- PDES, Inc. Users : Hughes/Delco
- PDES, Inc. Suppliers : Delco Electronics, Molex
- ProSTEP Users : Bosch, Bertrandt, ITT, Siemens
- Vendors : UG, Dassault, Intergraph, Syrko, HP
Parametric Technologies

✓ Status

- Many systems, applications and production parts being used
- Testing geometry first and configuration management in Phase II
- Need involvement of additional US car manufacturers
- High level of interest by Japanese automotive manufacturers

ISAP Participants Phase 2



STEPnet/PDMnet



- ✓ Interoperability testing forum : STEP developers and users conduct interoperability testing over the internet.
- ✓ How well products from numerous vendors communicate with each other, i.e. interoperate?
- ✓ STEPnet Round 10 Testing
- ✓ PDMnet Round 2 Testing
 - new rounds start every 6 months
- ✓ Validity Check
 - Total number of shells
 - Total number of curves
 - Total Volume

Product Status



STEP Vendor Translators		PDES, Inc.	
As of August 1997			
Vendor	Commercial Release Date	AP 203 - IS	STEPnet Participant
		1 2 3 4 5 6 7	
Dassault/Cetra (V4.1 d)			*
EDS/UG (V13.0)			*
CVICAD/US5 (V1.1)			*
SDRC (V5.0)			*
Autodesk (V1.0)			*
Autodesk (V1.0)			*
MSC/Aries (V1.1)			*
PTC/Pro/E (V1.0)			*

Key to AP 203 (Commercial Release)

1. Configuration Management
2. Surfaces and Wireframes
3. Wireframes with 1 entity
4. Manifold surfaces with topology
5. Freeform (translucency) Representation
6. Advanced Boundaries VR Representation

Key to AP 203 (IS) (Interoperability)

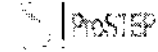
1. Commercial Design with 3D
2. Assembly for Part with 10

Notes

Trading Standards International standard updates provided by Dassault and SDRC (as to D-STEPnet)

A - 100% Assembly and 100% Part
An - 100% Assembly and 100% Part

ProSTEP Benchmark

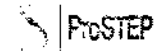


- ✓ 2nd Benchmark, April 1997
- ✓ Capability of the AP214 translators with respect to the exchange of solids

- ✓ Scope (AP214 CC1, CC2)
 - Geometry data : Solids, Surfaces (UoF G3, G5)
 - Color, Layer, Group (UoF P1, S1)
 - Results led to first productive STEP applications
 - Next milestones : Assemblies, Draughting

- ✓ 3rd ProSTEP Benchmark, December 1997

Results of the 2nd ProSTEP Benchmark



		To:		From:													
		CADDS Computerision	CATIA debs	EMS Intergraph	Pro/Engineer PTC	SolidDesigner CoCreate	Syrko Mercedes-Benz	Unigraphics EDS	CATIA Dassault Systemes	Euclid Quantum MIRA Division	IDEAS	SDRC					
Translators already tested in the first Benchmark	CADDS Computerision	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	CATIA debs	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	EMS Intergraph	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Pro/Engineer PTC	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	SolidDesigner CoCreate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Syrko Mercedes-Benz	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Unigraphics EDS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Translators being tested for the first time	CATIA Dassault Systemes	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Euclid Quantum MIRA Division	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	IDEAS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	SDRC	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

- Loss(white)
- Solids as Surfaces (cross-hatched)
- Solids as Solids (black)

Benchmark in accordance with STEP AP214 / CC1, CC2 - Source: ProSTEP 6/97

Icebreaker

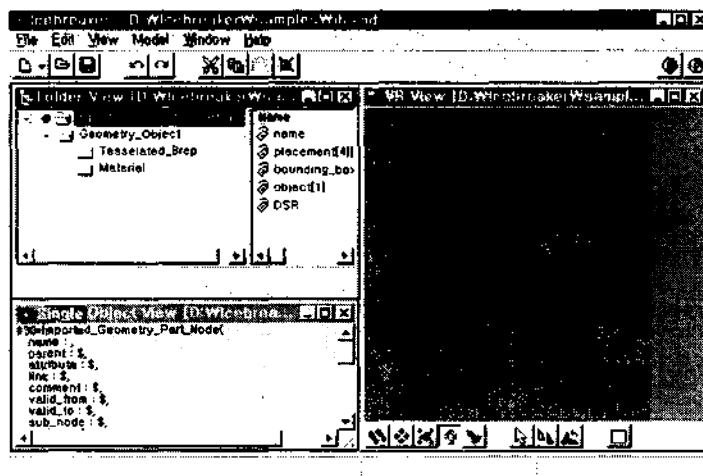
ICEBREAKER

- ✓ Intranet-based Engineering Communications Application
 - due for release in Q4,1997
 - beta test at 3M, AlliedSignal, Boeing, KAIST, Polaroid
 - US (ewags@tiac.net), Sweden (ulfli@cascade.se)
- ✓ Features
 - Engineering Communications using Intranet or e-mail system
 - Combines EXPRESS for data modeling and Microsoft's COM/DCOM for applications integration
 - Designed for Windows 95 and NT Personal Computers
 - Complimentary to major CAD, PDM and ODBC-compliant systems
 - For use with existing data management and business infrastructure tools
- ✓ Tuning Data into Information!

User Interface

ICEBREAKER

Folder View, Virtual Reality View, Single Object View, Schema Browser View



PDM Schema



- ✓ ProSTEP, PDES, Inc., and JSTEP announce agreement on PDM Schema
- ✓ November 4, 1997
- ✓ Interoperable with STEP AP203, AP210, AP214, and AP232
- ✓ Neutral specification allows for the exchange of the following types
 - item master data (part identification, approval of part version)
 - item structure
 - item classification
 - item property (mass, costs)
 - document management (identification, revision ...)
 - work management (engineering change request, EC order, project)
- ✓ Vendors of PDM systems are asked to join ProSTEP's PDM Round Table and PDES, Inc.'s PDMnet.