

# Understanding EDMControl

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## Glossary



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# Preface

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Concurrent engineering is replacing the more traditional serial engineering process in today's fast-paced and competitive large-scale project world. *Understanding EDMControl* provides the tools and method to supplement concurrent design engineering practices.

## Your Comments

We welcome your suggestions and comments about this or any other documentation. Send your comments in e-mail to `doc-webhelp@ptc.com`

## Online User Documentation

Online documentation is provided in HTML. PostScript files of each book in the online collection are also provided. You can print the PostScript files for hard copy books. The documentation media contains the PostScript files.

## Related Documents

The following documents may be helpful as you use *Understanding EDMControl* :

- *Understanding EDMInformation*
- *EDMInformation User Guide and Menu Reference*
- *EDMControl Administrator Guide*
- *EDMInformation Administrator Guide*
- *EDMControl User Guide and Menu Reference*

## Book Conventions

The following table illustrates and explains conventions used in writing about CADDs applications.

Use of the Convention	Examples	Explanation
Menu selections and options	List Section option, Specify Layer field, File menu	Indicates a selection you must make from a menu or property sheet or a text field that you must fill in.
User-selected graphic location	X, d <sub>1</sub> or P1	Marks a location or entity selection in graphic examples.
User input in CADDs text fields and on any command line	<code>cvaec.hd.data.param</code> <code>tar -xvf /dev/rst0</code>	Enter the text in a CADDs text field or on any command line.
System output	<code>Binary transfer complete.</code>	Indicates system responses in the CADDs text window or on any command line.
Variable in user input	<code>tar -cvf /dev/rst0 filename</code>	Replace the variable with an appropriate substitute; for example, replace filename with an actual file name.
Variable in text	<code>tagname</code>	Indicates a variable that requires an appropriate substitute when used in a real operation; for example, replace <code>tagname</code> with an actual tag name.
CADDs commands and modifiers	<code>INSERT LINE TANTO</code>	Shows CADDs commands and modifiers as they appear in the command line interface.
Text string	<code>"SRFGROUPA"</code> or <code>'SRFGROUPA'</code>	Shows text strings. You must enclose text string with single or double quotation marks.
Integer	<code>n</code>	Supply an integer for the <i>n</i> .
Real number	<code>x</code>	Supply a real number for the <i>x</i> .
#	<code># mkdir /cdrom</code>	Indicates the root (superuser) prompt on command lines.
%	<code>% rlogin remote_system_name</code> <code>-l root</code>	Indicates the C shell prompt on command lines.
\$	<code>\$ rlogin remote_system_name</code> <code>-l root</code>	Indicates the Bourne shell prompt on command lines.



# Overview of EDMControl

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The following pages introduce you to EDMControl, a solution to the problem of sharing information among design team members, in the concurrent engineering environment.

- Concurrent Engineering and EDMControl
- EDMControl's Solution
- Overview of EDMControl
- How EDMControl Works
- Constructing Objects from the Model
- Classifying Objects by their Functions
- Maintaining Security within the Project
- Tracking Changes in the Model
- How Changes are Tracked
- Identifying Changes That Have Been Made
- Maintaining Data Integrity
- Supported Product Versions

# Concurrent Engineering and EDMControl

Concurrent engineering is replacing the more traditional serial engineering process in today's fast-paced and competitive large-scale project world. EDMControl provides the tools and method to supplement concurrent design engineering practices.

## What is Concurrent Engineering?

Concurrent engineering is defined as the design of products and their manufacturing processes by several persons or teams acting in conjunction with one another.

### What is Required?

To be successful, this method requires management support, teamwork, consensual decision-making, and agreement on the most logical solution to a problem.

### How is it Approached?

In the concurrent approach, individuals and teams attack all aspects of a product's development simultaneously, interacting with one another when necessary, and informing each other of progress made.

### What Are the Benefits?

Benefits of concurrent engineering are numerous:

- Most changes are made early in the development cycle when they are easiest to make and are least expensive
- Fewer prototypes are required

The end result is

- Less time is spent in development
- Higher quality products are manufactured
- All at a lower cost

# EDMControl's Solution

EDMControl provides the solution to the problem of concurrent engineering interaction by providing an environment in which many people can, simultaneously, post to the database changes that they have made, notify others of those changes, and access changes that have been made by others.

EDMControl provides tools for the management of CAD/CAM/CAE models and drawings, together with their geometrical zones and functional relationships.

## Typical Problems

The following table lists solutions provided by EDMControl.

**Table 1-1 EDMControl Solutions to Concurrent Engineering Problems**

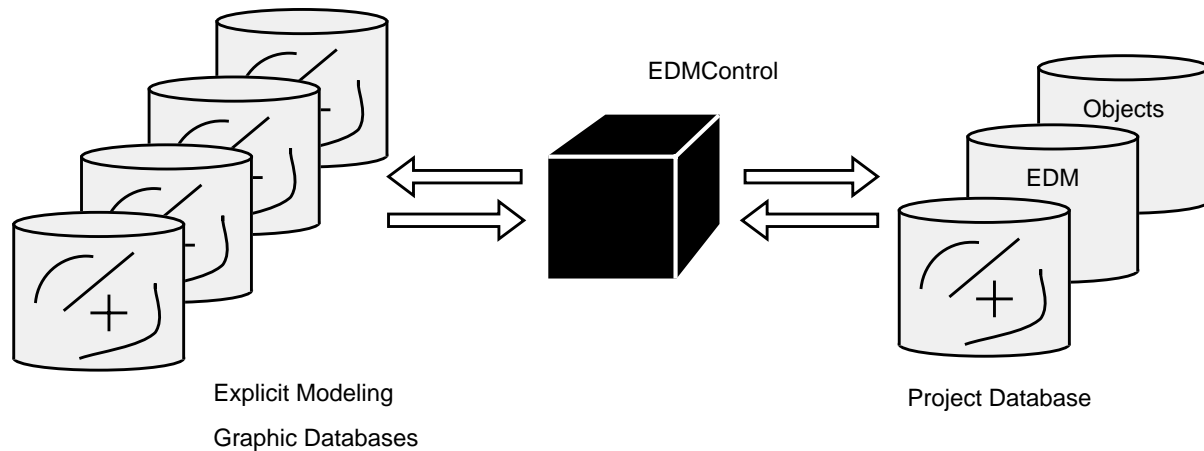
<b>Engineering Problem</b>	<b>EDMControl's Solution</b>
Managing large projects efficiently	Geometrically partition the project into manageable zones
Classifying data	Classify model data by its function (discipline)
Retrieving data efficiently	Provide for easy retrieval of model and drawing data based on zone and function criteria
Protecting data integrity	Ensure the integrity of project data by controlling user access to specific zones and functions
Accessing the most recent data	Provide members of the design team with access to released project data as well as the latest design changes
Identifying changes made by others	Highlight graphically (in color), or in report form, changes that have been propagated by other members of the design team
Tracking design progress	Save and track versions (snapshots) of model parts for managing changes
Sorting data logically	Store graphical data in model parts, and related non-graphical project data in RDBMS tables

# Overview of EDMControl

What is EDMControl?

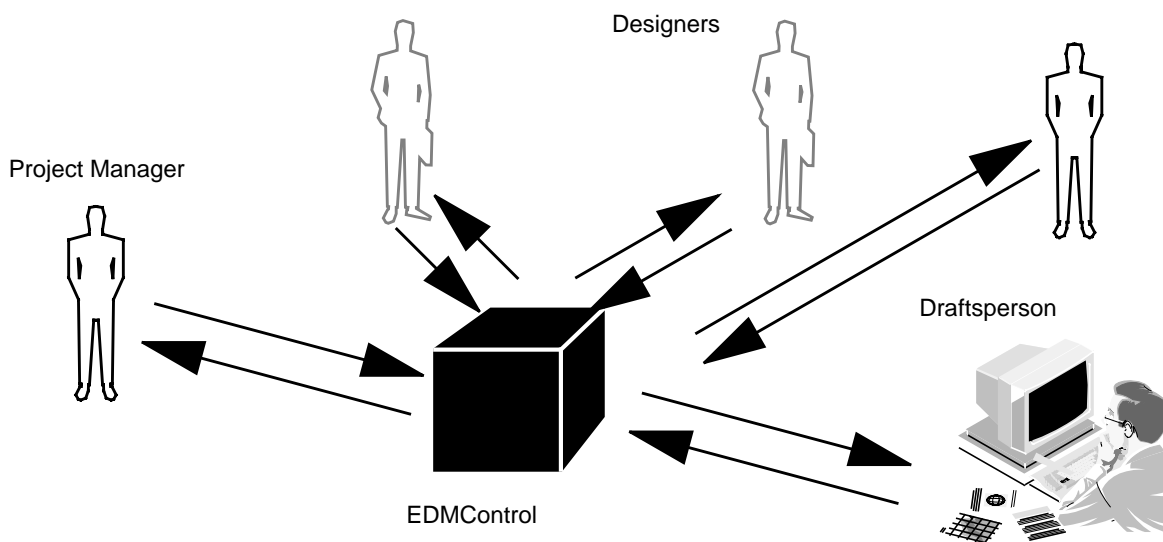
EDMControl is a change management system for Explicit Modeling models, parts, and drawings.

It is based upon geometric zones and functional classifications.



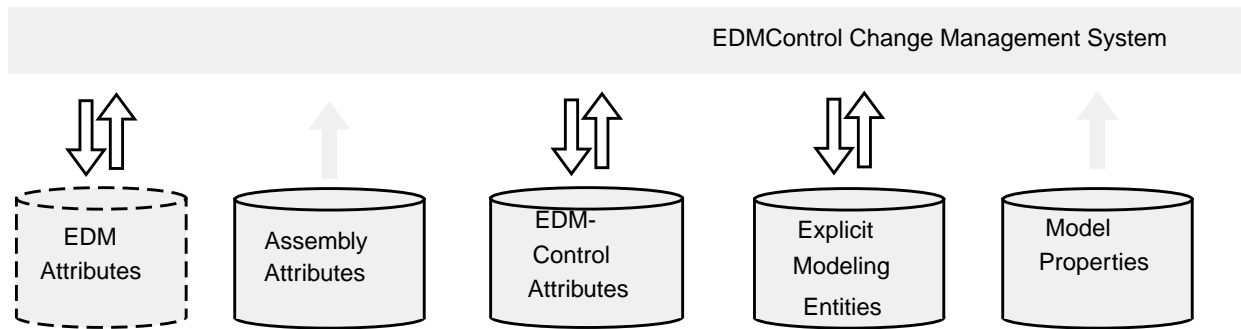
## EDMControl Creates a Multi-user Environment

EDMControl is designed to quickly and efficiently meet the needs of many users, all working on the same project. Simultaneous input, and flexibility in data display, make it the solution of choice for teams of designers and drafters.



## Why do you Need EDMControl?

Working with large numbers of models and drawings belonging to many engineering disciplines can be awkward in a concurrent engineering environment. Engineers need tools to integrate multiple discipline designs and manage their change.



## Who Works with EDMControl?

EDMControl users fall into three primary categories:

- Project Administrator
- System Administrator
- End Users

The size of a project will determine whether one person fills more than one of these positions, or even if the scope of the project is large enough that the responsibilities of one of these positions must be delegated to subordinates.

## What are the Responsibilities of EDMControl Users?

**Table 1-2 EDMControl Users**

<b>User Category</b>	<b>Basic Responsibilities</b>
Project Administrator	Responsible for maintaining the project data, zones, and disciplines (functions) in the associated project database
	Co-owner of the corporate data tables
System Administrator	Responsible for building and maintaining the RDBMS associated database
	Co-owner of the corporate data tables
	Responsible for customizing the user interface
End Users	Secure from the Administrator the proper access privileges for the zone/discipline combinations they will be working in
	Post model changes to the project database Retrieve model changes from the project database

### Is Networking Supported?

With many people working concurrently, network support is invaluable. RPC based networking software is provided for systems supporting NFS. ORACLES' SQL\*NET© networking software is also optionally supported.

# How EDMControl Works

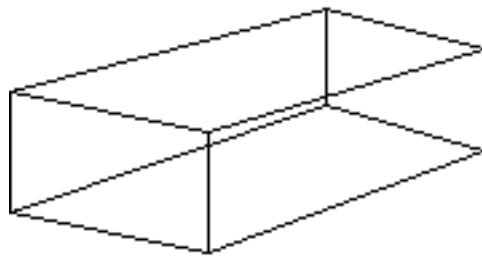
Zones play an important role in tracking information. They help to partition the information into accessible, usable, modules.

## Zone Partitioning

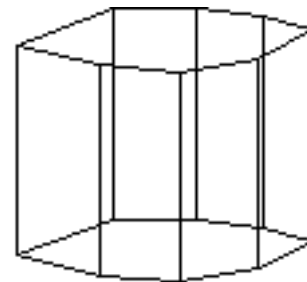
EDMControl allows the geometric partitioning of a large project into more manageable zones. These zones enclose specific functions and model parts. They allow you to efficiently retrieve data from the project database.

## Defining Zones

The primary zone is the project zone. It encompasses the extents of the entire project. All other zones are located within the project zone.



Rectangular



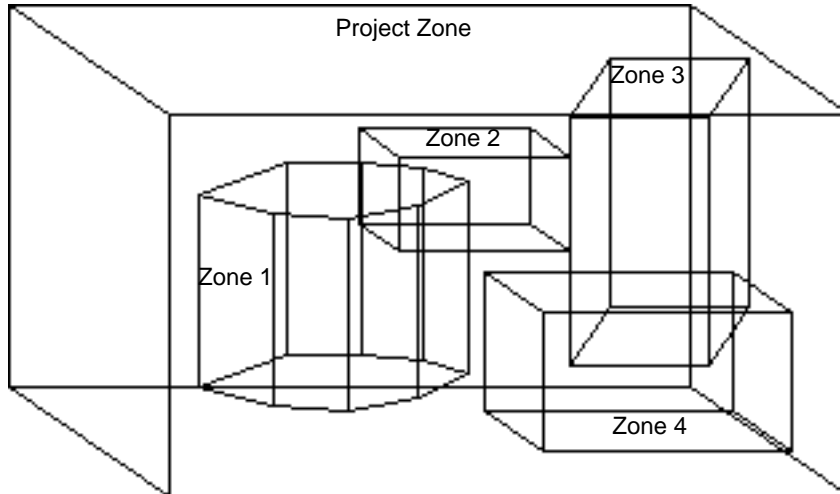
Polygonal

Zones do not have to be contiguous. They may overlap each other. And can even geometrically coincide when associated with different disciplines.

Each zone must have a unique name. You can generate reports based on the definition of a zone.

## Work Zones Relate to the Project Zone

All work zones must lie within the extents of the project zone, regardless of shape or orientation.

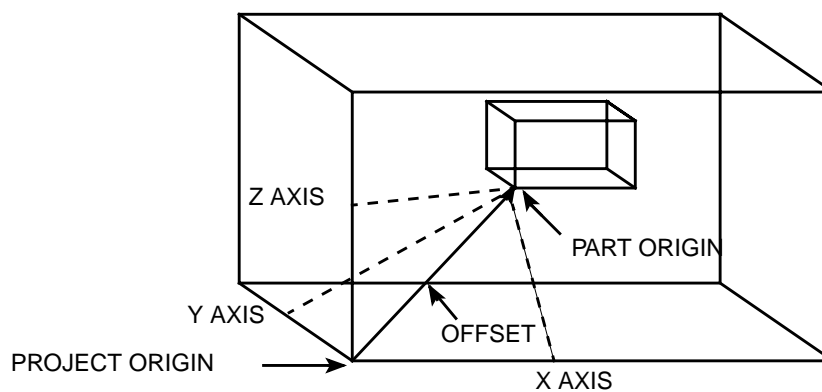


## Explicit Modeling Parts Relate to the Project Zone

RDBMS tables, containing graphical and nongraphical (attribute) data, are the project database.

You make your active Explicit Modeling part a work part by linking it to the project database.

The origin of the work part relates to the origin of the project. This positions your part within the project, and this part to all other parts in the project.



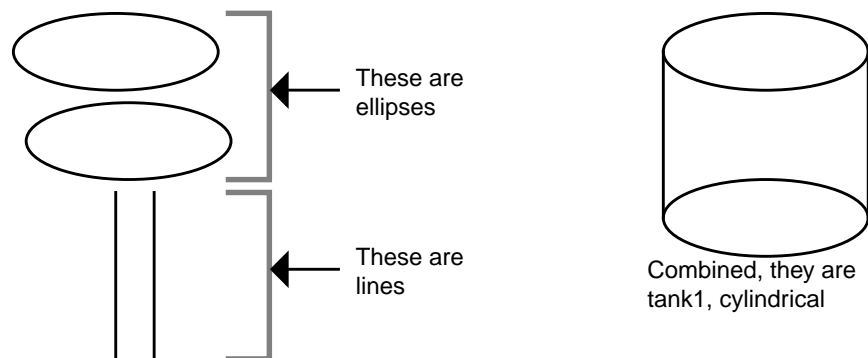


# Constructing Objects from the Model

## EDMControl Constructs Objects from Graphic Entities

An object is a group of geometric entities. Individually, these entities are lines, arcs, circles, ellipses, etc. When some of them are combined, they become objects.

These objects are stored in Explicit Modeling parts.



EDMControl uses rules to construct objects from geometric entities. You can customize these rules.

## Customizing the Object Construction Rules

Object Construction Rules are defined by the Project Administrator and specify the order and magnitude of importance of the objects' attributes.

Basically, an object construction rule is named, and then encompasses rules that

- group entities
- filter entities based on non-graphic properties
- filter entities based on entity types
- filter entities based on layers
- calculate geometric extents
- calculate a geometric origin
- calculate a geometric length
- automatically assign a name
- automatically assign a stock number
- establish a priority governing the application of the rule if other rules exist.

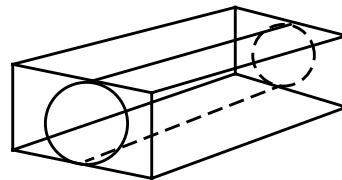
## An Object's Extents are used for Tracking

Objects are three-dimensional and consist of length, breadth, and depth.

These volumetric extents of each object - maximum length, breadth, and depth - are posted to the project database.

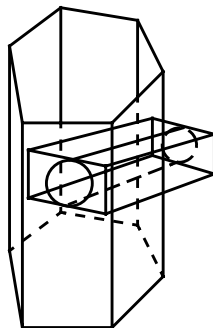
The extents are used to determine whether the object is included in, or excluded from, a zone.

An object must lie completely within a zone to be considered as included in that zone.



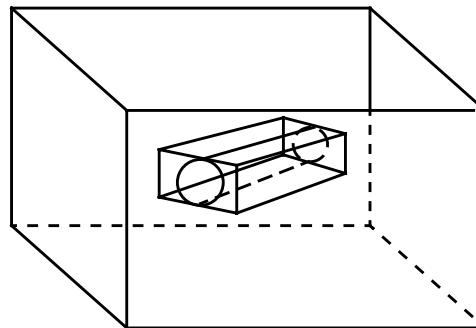
Object = Flue

Zone 1A



Excluded from zone

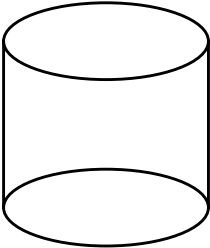
Zone 2B



Included in zone

## Storing the Constructed Objects

The objects that are created from the entities, using the construction rules, are stored in the Object table in the project database.



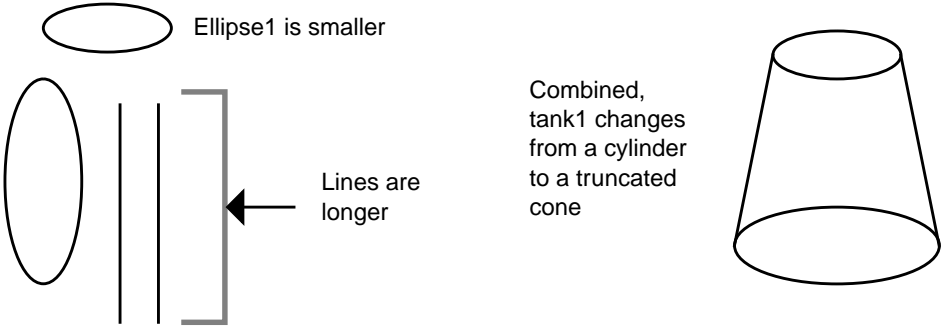
Tank1, cylindrical, air tank

## Tracking Changes in an Object

EDMControl detects changes in entities.

EDMControl knows to which object a changed entity belongs.

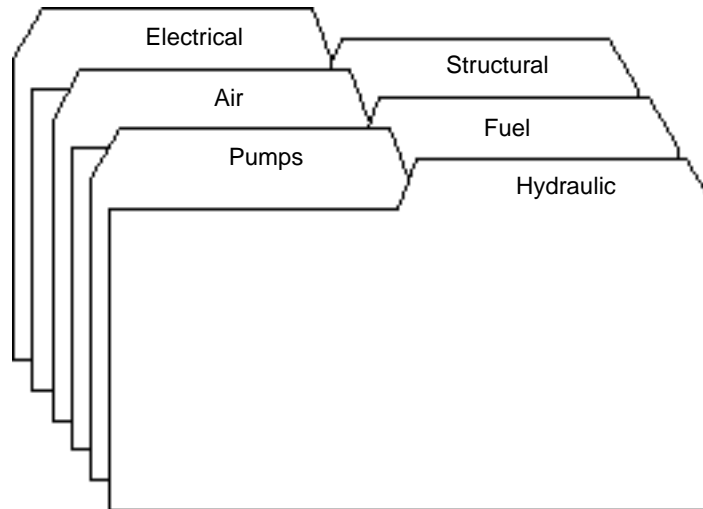
Therefore, EDMControl knows which object has changed and what it is about the object that has changed. As an example, the designer decides to reshape Tank1, air tank.



# Classifying Objects by their Functions

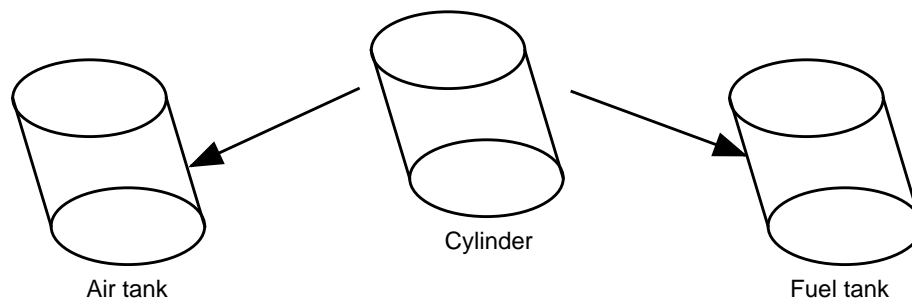
## Functionally Classifying Model Data

EDMControl allows you to classify model data by function (discipline). Disciplines are systems that are logically grouped within the project. Examples of such systems are: electrical, structural, air, fuel, pumps, hydraulic, etc.



Within each system are contained subsystems. For example, power and switching might be two subsystems of the electrical system.

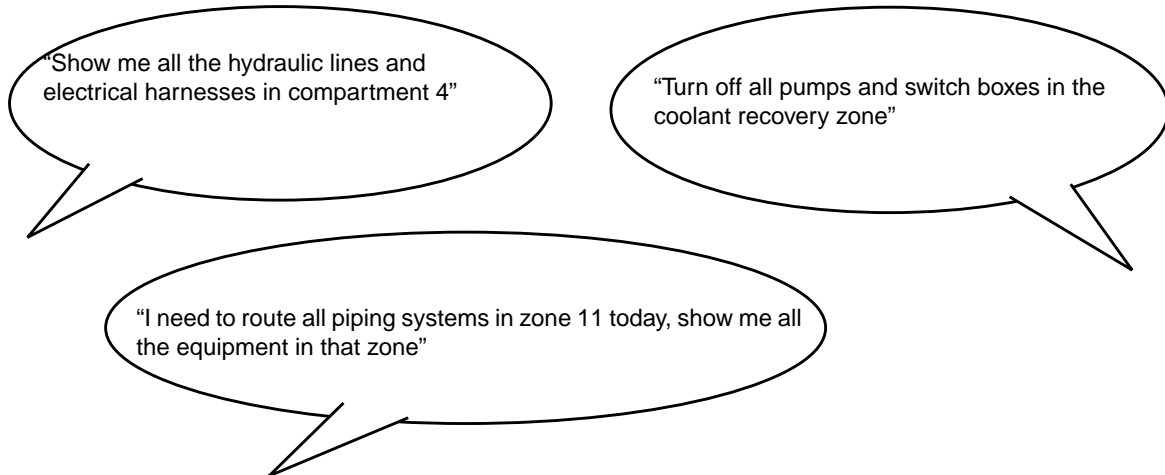
Disciplines are also used to classify objects in a project. A cylinder is an object. Associating an instance of the cylinder with the air discipline defines it as an air tank. Associating another instance of the cylinder with the fuel discipline defines it as a fuel tank.



Associating disciplines with objects, and zones, allows faster and easier data retrieval.

## Flexibility of Data Display

EDMControl gives you the ability to combine zone and disciplines in combination for a flexible way to display model and drawing data.



Zones and disciplines are not mutually exclusive. Combinations of different zones and disciplines identify different kinds of information.

You can also identify sets of zone and discipline combinations. This provides a greater range of information without having to identify a series of individual combinations.

Zone partitioning combined with discipline definition facilitates more data retrieval.

However, while the displayed data is retrieved from many sources, EDMControl eliminates the need for you to identify specific sources and information details.

EDMControl does the work and you see the results.

# Maintaining Security within the Project

Users are granted access privileges to zones. These privileges are granted at the project level. They can be granted as read-only or read/write. Different privileges can be granted for different zones.

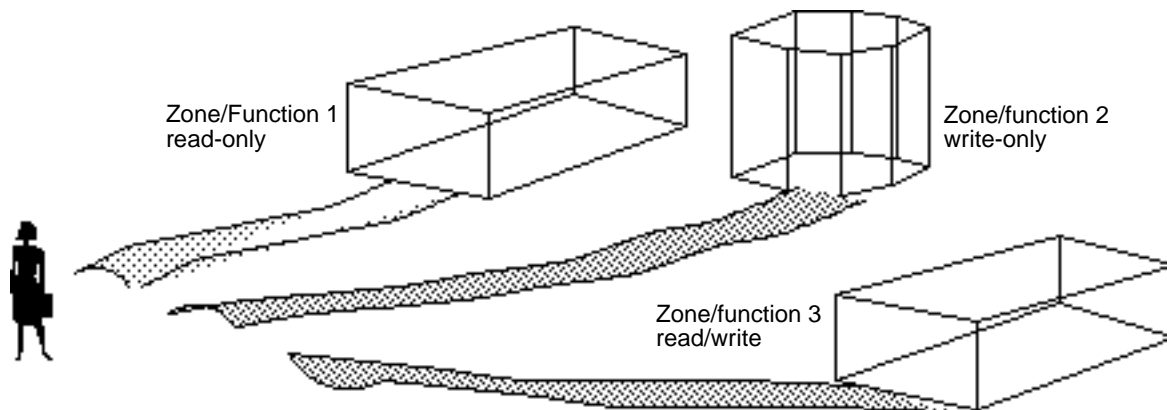
The combination of geometric zone definition, discipline definition, and access privileges, guarantees the proper access and security of the project.

## Privileges Control Access

Access privileges to specific zone and discipline combinations provide maximum security for the integrity of project data.

Privileges are granted at the project level. They are granted to users based upon the type of access needed by that user for each specific zone/discipline or sets of zone/disciplines combination.

Additionally, you can specify read-only or write-only access at your own level. You must have read/write access before you can link for write-only.



## Kinds of Access

Three kinds of access privileges exist:

- **Read-only:** This access privilege allows the display of data, whether generated by you or someone else, without the ability to make changes.
- **Read-write:** This access privilege displays information and allows you to add, modify, display, or delete data.

- **Write-only:** This access privilege allows you to make changes without displaying all of the data. You must have read-write access before linking for write-only.

Its purpose is to unclutter the display of data. A display may contain so much data as to make it difficult to make changes. Turning off the display allows you to readily make changes.

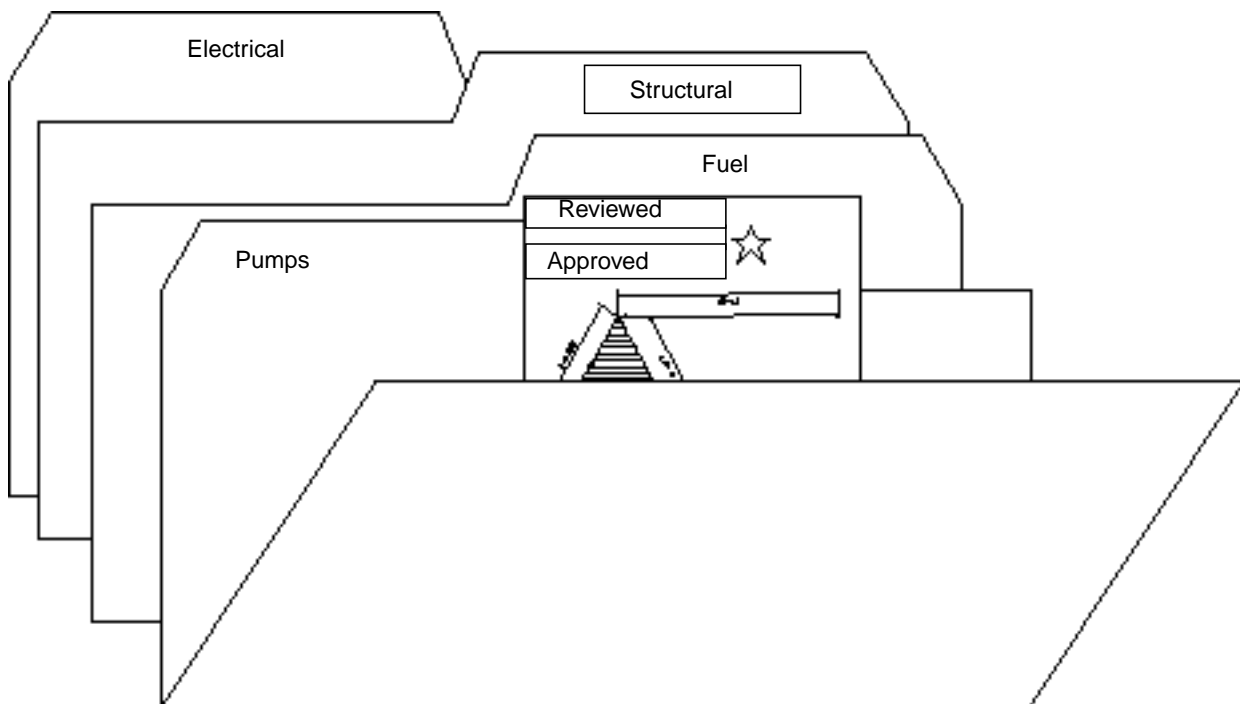
# Tracking Changes in the Model

## Versions are Known as Snapshots

Changes, such as changing the shape of a tank as on a previous page, cause versions.

Inwork versions are called snapshots in EDMControl because they are a moment in time. Snapshots are labelled and stored for future use in identifying changes.

When a version is reviewed and approved, it becomes a released version.



## Versions of Graphics are Stored in EDM

EDMControl transparently stores versions of Explicit Modeling graphical databases in Company's EDM (Engineering Data Manager).

In-work versions (the work part) are maintained by the user. Versions are maintained by EDM.



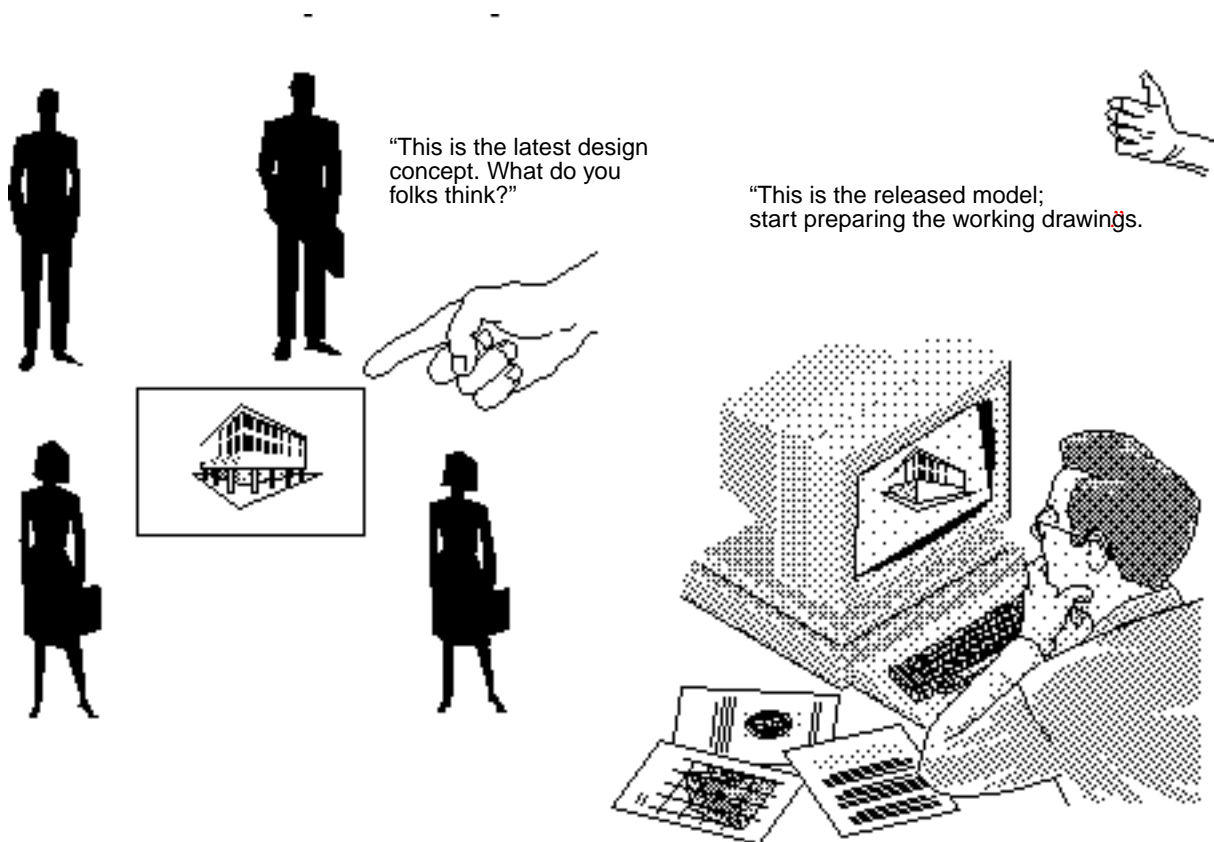
## Selecting the Version to Display

EDMControl allows you to display the released version which has passed engineering review. You can also view the latest design changes by displaying the latest inwork version (snapshot).

Drafters will probably select the released version, as a stable model from which to create their drawings.

Designers will probably select the latest in-work version, in order to see the latest design of the model.

Management may decide to compare the two in order to see what changes are being made.



# How Changes are Tracked

## Changes between Versions are Detected

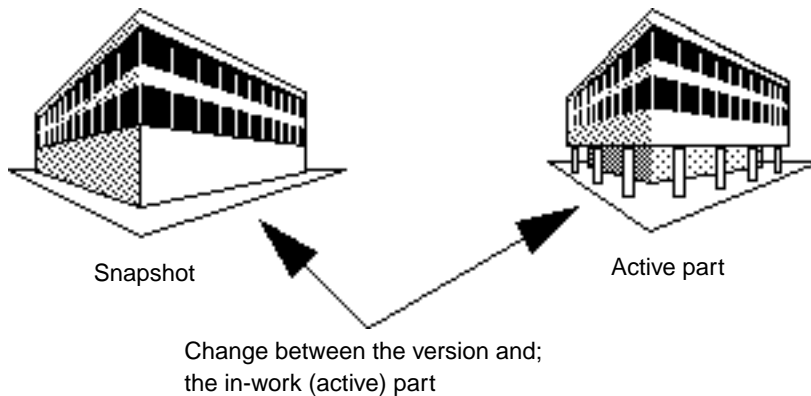
EDMControl detects changes in entities between two versions of an Explicit Modeling graphics database.

Each time an object is posted to the project database, the changes that are noted are recorded by the system. Other members of the design team are then notified of the changes.

## A Snapshot is Created

When the changes are noted, the Explicit Modeling graphics database is time stamped. The change is also programatically filed for synchronization purposes.

A version of the Explicit Modeling graphics database, called a snapshot, is created at the time of posting. This snapshot is stored on the local system, as well as in EDMVault.



# Identifying Changes That Have Been Made

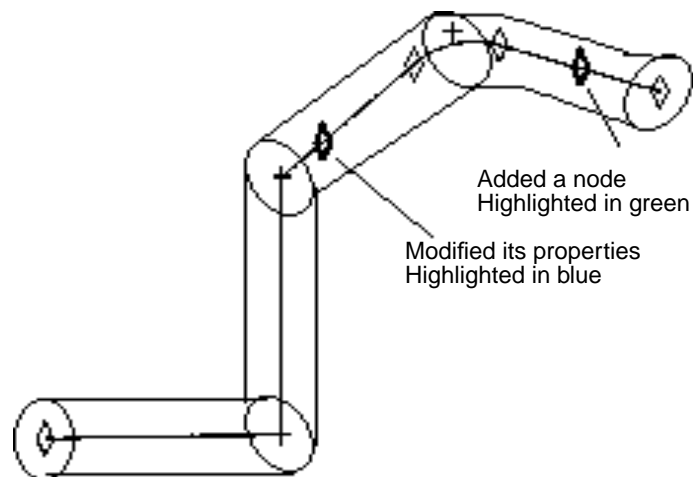
## Highlights Changes in the Model

EDMControl identifies changes that have been made to a model by highlighting those changes graphically or in report form.

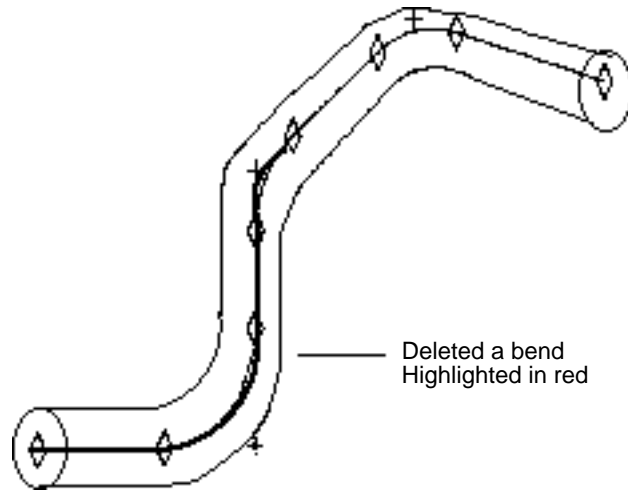
Your active part is compared to a snapshot and changes are identified. When the changes are graphically highlighted

- green identifies added entities
- blue identifies modified entities
- red identifies (in the snapshot) deleted entities

**Figure 1-1 A VIEW OF A CONDUIT IN THE CURRENTLY ACTIVE PART**



**Figure 1-2 SNAPSHOT OF THE CONDUIT**



## Identifying Changes in Report Form

If you decide to have the information in the form of a report, one similar to that illustrated below is displayed.

STATUS REPORT	
Part: ABC-PART-5	← (This is the active part)
Discipline = EQUIP_A      Zone = PROJECT	] Snapshots
Display: ON    Id: 642 Partname: PART2	
Status: UP TO DATE Current Snapshot = 1	
Discipline = HVAC_A      Zone = ZONE_6A	
Display: OFF    Id: 646 Partname: PART6	
Status: UP TO DATE Current snapshot = 1	
Discipline = ELECTRICAL_A      Zone =ELEC1	
Display: ON (not viewed Id: 604) Partname: PART12	
Status: OUT OF DATE Current Snapshot = 5 (Last viewed = 3)	
Display: NEVER BEEN DISPLAYED (PUT) Id: 637 Partname: PART15	
Status: UP TO DATE Current snapshot = 1	

# Maintaining Data Integrity

## Storing and Synchronizing Information

EDMControl and EDMInformation share many RDBMS tables. All objects, and transaction information related to the objects, are continuously updated. This encourages real-time projectwide querying using SQL capabilities.

## Storing Data

- Graphics data is stored in the Explicit Modeling database.
- Nongraphic attribute data is stored in the project database.
- Versions of work parts are stored in EDM Vault.
- Changes are posted to EDM Vault and the local disk.

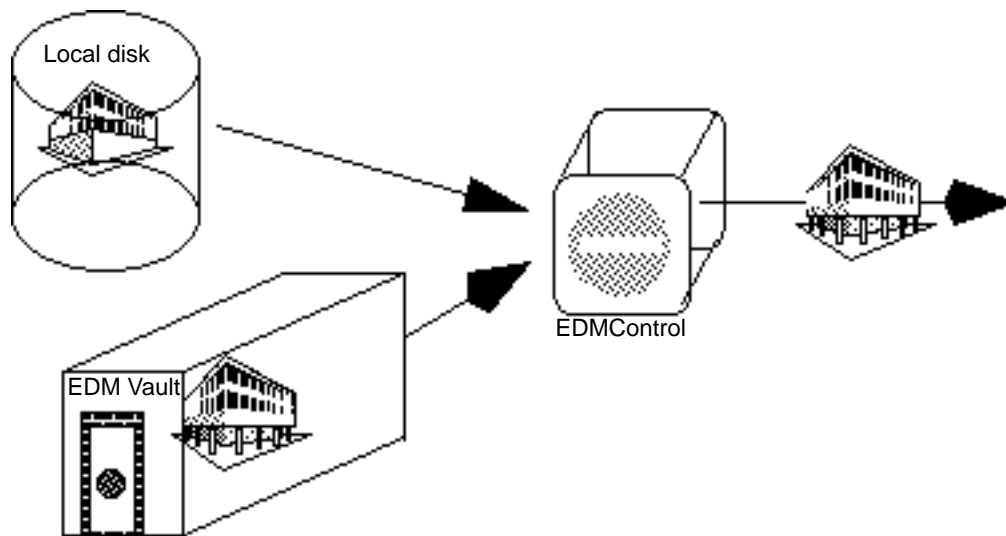
## Synchronizing Data

When changes are posted, a version is filed in EDM Vault. A copy is also posted to the local disk. When information is being retrieved, EDMControl verifies that the copy on the local disk and the version in EDM are the same.

If the two versions are not the same, a read-only copy is transparently signed out to the system from EDM.

Database integrity is maintained by transparently synchronizing the databases with each other at all times.

Programmatic interfacing ensures that a user does not have to keep track of other users' data. EDMControl does it for the team.



# Supported Product Versions

EDMControl Currently Uses ORACLE as its RDBMS

EDMControl currently uses ORACLE version 6.0.33 as its associated relational database.

Please note: EDMControl can use ORACLE version 6.0.26 or higher with some modifications.

EDM Support

EDMControl currently uses EDM version 5.0 as its data management system.





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# Glossary

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This Glossary contains definitions of words and phrases particular to EDMControl.

## Access Privileges

Access to the Project Database is granted on a username/password basis for zone/discipline combinations.

## Change Control and Propagation

EDMControl propagates changes to users by tracking objects, snapshots, and work parts whenever changes are posted. Users decide when to post or retrieve object changes from the database.

## Change Notification

Users may check at any time for modeling changes based on one or more disciplines and graphically highlight these changes.

## EDMControl

A change control management system for Explicit Modeling designs and drawings based on geometric zone and functional relationships.

## Database Administrator

Responsibility and authority for building and maintaining the RDBMS and customizing the user interface.

## Disciplines

Subdivisions of a product based upon the functional classifications (trades and crafts). For example, hot water pipes, HVAC ducts, and so on.

End User

Member of the engineering design team who utilizes EDMControl.

Offsets

The positioning of a Work Part with respect to other Work Parts within the project coordinate system.

Object Construction Rules

A formula used by EDMControl to construct objects from entity primitives stored in the Work Part.

Objects

A group of graphical entities created each time a user posts changes. The graphical entities are used to display objects and are stored in snapshot versions of the Work Parts. Object data is stored in the RDBMS tables.

Project

An undertaking requiring extensive planning and work, that has a definite objective with specific start and completion dates.

Project Control

The phase of a project management cycle that compares actual performance with the planned schedule of objectives and implements corrective measures to avoid project completion delays.

Project Database

The database consists of all the Explicit Modeling Work Parts, the Snapshot version of Explicit Modeling Work Parts associated with a Project, and other project data contained in RDBMS tables.

Project Parts

Explicit Modeling parts, and data stored in RDBMS tables, associated with a specific project.

Project Reporting

Reports generated, using SQL queries, about objects, parts, transaction dates, changes, etc., based on data stored in the Project Database RDBMS tables .

### Relational Database Management System - RDBMS

Database used by CADDInformation to store and manage attributes, i.e. ORACLE. EDMControl shares some, and uses some, of the CADDInformation tables.

### SCRIPT

A global modifier which allows the execution of a UNIX shell script, set up by the project administrator, from within the modeling session.

### Snapshots

Versions of the Work Part created each time a user posts changes to the Project Database Used to compare and track changes between versions, and to display objects.

### Structured Query Language - SQL

ANSI standard query language used for defining and manipulating data in a RDBMS.

### Work Parts

Standard Explicit Modeling parts that have been linked to a specific EDMControl Project. They are used to store objects, and post objects, to the project database.

### Work Table

Table assigned to each user for temporary storage of data associated with the current EDMControl operation.

### Zones

Geometric subdivisions of a project as defined by a polygon in the XY plane with a minimum and maximum Z elevation.

### Zone/Disciplines

Standard Explicit Modeling parts that have been linked to a specific EDMControl Project and are used to store objects, and post objects, to the project database.



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