CREATION AND MANAGEMENT
OF PDMS AND E3D
CATALOGUES
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1. PRESENTATION

Partner of the largest engineering and industrial companies, ORINOX specializes in AVEVA software services and CAD (computer-aided design). Our industrial plant design techniques integrate industry databases for faster information delivery including drawings, isometrics, support documents, materials lists, intuitive design models, videos and realistic snapshots.

Orinox’s primary design tools are AVEVA PDMS™ and AVEVA Everything3D™, the leading engineering software solutions worldwide in the domains of processing, energy, and naval construction.

Orinox has instituted a Quality Management System (QMS) meeting ISO 9001 criteria. Our Quality Manual is available on our company website: www.orinox.com
2. PURPOSE

The purpose of the AVEVA PDMS™ and AVEVA Everything3D™ catalogues is the capability to insert components into DESIGN without having to create a model for each use. The geometry of all components and their parameters (text information, physical properties, materials, etc.) are created via different modules of PDMS/E3D (PARAGON, PROPION, etc...) and inserted with their specifications. Thus, the pipefitter has access to a limited selection of items, compatible with the characteristics of the line he designs. This operational mode enhances designer efficiency, ensuring that the project is on-time and on-budget, and improves overall quality by reducing the risk of errors.

In terms of the working methodology imposed by PDMS and E3D, when we speak of catalogue, we mean all elements that allow the use of a component in the 3D models and for the output of the materials lists, 2D drawings, and isometrics. This includes the definition of shapes, text details, materials, physical properties, specifications, tables of nuts and bolts or any tool used in PDMS that is necessary for the proper functioning of a design project.

Orinox has developed expertise in the creation and the implementation of several types of PDMS and E3D catalogues:
- Piping
- Steel sections, fittings and joints
- Civil engineering
- HVAC
- Cable trays
- Equipment
- Access (ASL and SLH)
- MDS

3. REFERENCES

ORINOX has exercised its PDMS catalogue knowledge for projects with the following clients:
4. PIPING CATALOGUE

4.1. Methodology
ORINOX, with its extensive PDMS catalogue experience, has developed a methodology for creating piping catalogues which optimizes time, reduces data entry errors, and controls the operation of each component in each of the specifications required by different modules of PDMS and E3D (DESIGN / MODEL, DRAFT / DRAW, ISODRAFT, PARAGON).

This methods consists of several steps:
1) Verification of the input data
2) Creation of the different cataloged elements
3) Creation of the required piping specifications
4) Checking the catalogue in different modules
5) Assistance with catalogue deployment

4.2. Verification of the input data
The first step of every catalogue project is the verification of the input data:
   Do we have all the documents (standards, datasheets…) required to start the project?
   Do the documents contain all the necessary information (dimensions, weights…)?
   Do the documents not contradict one another?
   Have all methods been validated with the client?
ORINOX takes particular care in validating and checking all the input data at the beginning of each project. We use document check monitoring tools to insure their validity. At the end of this verification phase, we are capable of presenting a report to the client detailing the document containing necessary information to create any component.

4.3. Geometries creation
ORINOX is able to optimize the creation of 3D shapes in order to reduce work duplication and sources of error, especially when entering the dimensions of the various components.

4.3.1. USE OF THE GENERIC GEOMETRIES
Similar components use standard geometric shapes, regardless of the regulating standards or manufacturing material. Thus, a bend remains a “torus,” whether it is made of steel or stainless steel, or whether it follows EN or ASME standards.

It is therefore unnecessary to create this shape many times, as there are different types of the same component. Since only the dimensions change between these types, it is always possible to reference a generic shape and enter the dimensions of a desired component. This methodology has been proposed by AVEVA, but ORINOX has elaborated the steps. It is also possible to create multiple types of connections by starting with a single shape. Thus, a single shape can create all the components of the same type.
Example of 3 bends created with the same generic shape:

- **Socket Welding (SW)**
- **Flanged (FL)**
- **Butt Welding (BW)**

This method of creating 3D shapes limits the number of shapes to create (Point Set, Geometry Set, Data Set) and saves time not only when creating the initial catalog, but also during future additions throughout project use. When a new element must be created, generic shapes can be directly referenced rather than creating a new shape from scratch.

More complex components (such as valves) may be configured directly from the 3D model in the DESIGN or MODEL modules. These geometries are called parametric. They present several advantages:

- For pre-project, even if the final type of the component is not yet defined, it is possible to insert a component of the same family with credible dimensions.
- Once the manufacturer datasheet is validated, the designer can modify the dimensions of the component directly in DESIGN or MODEL without having to reselect it or modify the catalogue.

The catalogue is then usable throughout different phases of the project: Pre-Project, FEED, Basic Design, Detailed Design, As-Built...

### 4.3.2. HIERARCHY CREATION

All components are coded according to a single key that is usually specific to each company. With this coding, the smallest typo can affect future use of the catalogue. This is why ORINOX created automatic component hierarchy to replace manual entry.

With our application, the person tasked with data entry uses a drop-down menu to select a subtype to characterize the component.
By selecting the appropriate option corresponding to each component, command lines are automatically generated in a PDMS and E3D macro file (PML). The person who enters the catalogue only needs to run the PML macro for the entire hierarchy to be generated.

The codification must be defined before the catalogue creation can begin. As codification will be different for each company, our application is fully configurable to be adapted to the needs of our clients.

ORINOX has also developed its own codification system for piping components. This system can be made available to our customers in order to minimize preliminary codification and thus the cost of catalogue development.

4.3.3. INPUT OF PARAMETERS (COMPONENT DIMENSIONS)

The input of parameters for each component can be tedious if done directly in the module PARAGON. Even if every version since PDMS 12.0 presents a dedicated window, the ergonomics are far from being as user friendly as an Excel spreadsheet. This is another reason why our program is useful for creating catalogues. When thousands of items require many parameters to be entered, it is necessary to find a program that is both simple and effective. Our spreadsheet allows data to be copied directly from the electronic catalogues of suppliers, thereby limiting the number of required manual entries and, consequently, the number of potential errors.

The values of certain parameters are often calculated from other parameters. With this application, the calculations are completed automatically in the spreadsheets based on formulas that are entered only once. This system prevents the data input operator from returning to the same data multiple times, or making the same calculation for each NS of a component.

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Here is one example of a data entry sheet:

<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
<th>Column 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value 1</td>
<td>Value 2</td>
<td>Value 3</td>
<td>Value 4</td>
<td>Value 5</td>
</tr>
</tbody>
</table>

In green, the data entered directly by the user into the spreadsheet.
In blue, the data obtained automatically from tables or formulas.
In this example (a valve), the utility of our program is clear. For this type of component, it would be necessary to manually complete 32 data entries in PARAGON, whereas in our program only requires 8 (the dark green columns). In addition, the data was copied and pasted from the PDF catalogue of a supplier. This reduces the number of manual entries to zero and typing errors are kept to a strict minimum.

The use of generic shapes also facilitates parameter input because it imposes a standardization of component parameters. Thus, the NS, tube diameters, types of connections, etc. are the same for many components and are always located on the same identified parameter. It is therefore possible to copy the values entered on one component for reuse on another. The number of manual data entries required is again diminished.

The PML macros files previously described will be elaborated with data from each component to create all of the SCOM of the CATE, as well as the SDTE, detail texts, etc. Thus the work performed in PDMS or E3D serves to initiate the PML macro files to create any of the required CATE.

4.3.4. MANAGING ADDITIONAL ELEMENTS

In a PDMS or E3D piping catalogue, geometric elements are not the only elements that are used. We also find SDTE, SMTE, bolt elements, etc. We can build upon our application to respond to the needs of individual clients. For example, an SDTE can be added in all CATE:

<table>
<thead>
<tr>
<th>SDTE SKEY</th>
<th>VEFL</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDTE Rtext</td>
<td>Ball Valve, Gearbox, RJ, Reduce bore, #2500, ASME B16.10</td>
</tr>
</tbody>
</table>

Thus, according to the requirements of the catalogue, our application can be adapted to insert all CATE useful elements. These items will be added to the PML macro file and then automatically generated when creating the CATE with all components.

4.3.5. CATALOGUE USE AND MANAGEMENT

The application developed by ORINOX also keeps an archive of all the components available in the catalogue, independent of PDMS. The archive allows updates and modifications to be made to the catalogue. As the catalogue of piping components continues to change (the dimensions of components or client needs may evolve), it is necessary to facilitate any upcoming adjustments to the PDMS or E3D catalogue.

This application can be run according to several different operating modes: complete creation of a component category, addition of components to an existing category or update of the components in a category. This method allows you to manage corrections or modifications to the components directly in our application. In addition, PML macro files always run a CATE in its entirety. It is therefore possible to make changes to all components of a CATE in a single operation.

The ORINOX method of creating PDMS and E3D catalogues not only facilitates the creation of the catalogue, but also serves as a useful tool for managing the catalogue on an ongoing basis.
4.4. Creation of piping specifications

Geometric elements are not accessible in PDMS DESIGN or E3D MODEL until they are inserted into specifications. ORINOX has developed a simple and rapid method to create and edit piping specifications when managing PDMS catalogues. The application uses the SPECON module. This module creates piping specifications from text files with the elements of the specification in a table format.

### 4.4.1. APPLICATION PRINCIPLE

The method for creating specifications consists of creating the TXT file that will be read by SPECON, which again limits the number of data entries to be entered manually. The straightforward system reduces human error and saves time.

### 4.4.2. PRESENTATION OF THE APPLICATION

The image below shows a partial data entry sheet. It consists of entries of the names of each SCOM to include in the specification and of choosing the material in a drop down list.

Based on this information, the different elements will be automatically linked based on their codification:
- Detail texts
- Physical properties
- Thickness tables
- …

A same group of SCOM can therefore be inserted into several specifications by naming the SPEC, and the associated material is modified in the application.

The application presented above allows us to save time, limit input errors, and create any piping specification. However, for projects requiring the creation of many specifications, ORINOX has developed specific tools adapted to the client’s needs and specifications.
4.5. **Catalogue verification**

In addition to reducing catalogue entry errors, ORINOX has developed a very thorough audit application for specifications and the elements they contain. For each of the specifications that are created, we issue the following verification features:

- A PIPE that includes all of the components of the specification for each NS
- An isometric of each PIPE
- One or more DRAFT of each PIPE, allowing visualization of the different levels of representation, the insulation, the center line, etc.

By reviewing these features allows us to verify the following:

- Connections between the components
- Geometries
- Insulation
- Level of representation and obstruction
- Isometric symbol
- Detail texts and material texts
- ...

This verification protocol assures that all catalogues created for our customers are fully functional and meet their expectations.

**PML window developed by ORINOX**

In addition to component verification tools, ORINOX has also developed a tool to verify the specifications created. The tables generated by this application indicate (in green) the components correctly inserted in the specification and (in red) the missing components.

It is a quick way to check if the PDMS or E3D SPEC are compliant with the project specifications.
4.6. **Catalogue deployment**

For each **PDMS** or **E3D** catalogue created, ORINOX proposes different support solutions for database deployment and methodology. These services can take several forms:

1. **Project installation and configuration**

   In order to ensure proper project standards, ORINOX proposes assistance with new catalogue and methodology setup. Our teams of administrators are available to install newly created databases and configure projects on-site.

2. **Methodological guides redaction**

   Each engineering team and project have their own needs for catalogues (available components, specifications, UDA). This is why our catalogue services also include the redaction of methodological guides. These manuals contain all the methods to be applied to projects: codification, hierarchy organization, preferred creation methods, verification methods...

### Extracts of an EDF-CIT redacted by ORINOX

The manuals can be more or less detailed (training reminders or instructions only) depending on the client’s needs.

3. **Staff training**

   ORINOX also proposes training sessions for all PDMS and E3D modules (DESIGN, MODEL, DRAFT, DRAW, ISODRAFT, PARAGON, PROPCON, ADMIN...) to train teams in proper catalogue use and maintenance. The complete list of our training sessions is available at ORINOX.com.
4.7. **ORINOX standard solutions**

The methods of creating and managing piping catalogues with PDMS is designed to meet the specific needs of our clients. ORINOX also offers standard elements for EN, ASME, and SMS piping, ready for immediate use.


A variety of piping design specifications that adhere to EN, ASME, or SMS are also already available, equipped with the most commonly used elements of each specification.

In order to meet the most urgent needs of our customers, the catalogues developed using the methodology detailed above are available immediately to begin PDMS or E3D projects as quickly as possible. These specifications allow the preliminary steps of projects to begin while others define the final specifications to be used.

5. **STEELWORK CATALOGUE**

The ORINOX methods for piping catalogue creation are also compatible with PDMS and E3D steelwork catalogues. The generic geometry methodology and the component creation application can be used on steelwork elements. However, the steelwork specification being far less complex than the piping specification, we usually create them using AVEVA methods.

6. **OTHER CATALOGUES**

ORINOX also creates other types of catalogues (HVAC, cable trays, equipment) using AVEVA methods. When large catalogues of these types need to be created, ORINOX is capable of developing tools and applications adapted to each type of catalogues to ensure efficiency and compliance of input data. Our experience and knowledge also enables us to develop customized tools for AVEVA solutions using several languages (PML, C#, PML.NET).

7. **RESULTS**

ORINOX’s expertise is designed to quickly and simply create PDMS and E3D catalogues, and to deliver them to customers in a reliable and operational form for any task, including geometric element and specification creation.

ORINOX guarantees maintenance and updates for all client catalogues.

In order to begin projects as quickly as possible, ORINOX offers its customers a range of complete EN, ASME and SMS-compliant specifications. Projects can be drafted in PDMS or E3D without having to wait for calculations to be completed.