

USING EDX TO EXCHANGE COMPONENT DATA

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D A T A M A N A G E M E N T

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Research has shown that about 80% of the product cost is committed early on in the design process as the components are selected for the design. Once these components have been selected and as the design progresses, it becomes increasingly more difficult and costly to change. Therefore the more part detail that can be provided up front to the designer, the better the part choices are in the long run.

One of the use cases for an EDX integration is to supplement the ECAD library with additional component data, or metadata, that will ultimately aid the engineer in the part selection process. Additional component data might include vendor data such as online part catalogs, or company-specific manufacturer and supplier information. This is important because the added component data enriches the data set that the engineer has at their disposal to select the right parts for their design.

The EDX Component Container is designed to communicate new or updated component data to the ECAD library. To accomplish this, EDX includes a three-level part definition that splits the component information into:

1. Internal Part Numbers that are normally defined by the customer
2. Manufacturer Part Numbers that contain the data supplied by the manufacturer of the part to describe it
3. Supplier Part Numbers that contain the supplier's (or component distributor's) logistics data for the part.

The internal part numbers typically contain an envelope description of a part that can be satisfied using any one of several manufacturing part numbers. This description consists of technical parameters that are aggregated from the associated manufacturing part. The designer typically searches for parts to use in their design using this aggregated data set. As an example, a resistor might have parameters such as resistance, tolerance or temperature coefficient.

The manufacturing part numbers normally consist of technical parameters that define the function of the part and datasheets that go into further detail about the part's function as well as its physical form. All of this data is provided by the part manufacturer. Manufacturers may also decide to include example library data and or reference designs for more complex parts. These additional files may be included as attachments to the manufacturer part in EDX.

The supplier part numbers typically contain the supplier's logistics data, such as lead time, last purchase price, how the part is delivered to the end-user (loose, tube, cut reel, reel, etc.), and so forth. Collectively, this component data is gathered in the EDX Component Data Package and is modeled as "Parts" and "Organizations", shown in Figure 1.



Figure 1: The EDX Component Data Package.

The designer is primarily interested in which manufacturer parts may be used when they specify a particular internal part number. In many cases, the ECAD library only contains the internal and manufacturer part numbers. Typically it is purchasing that is interested in the supplier part number data since it tells them where they can purchase the parts from, if they are available, the cost, and lead time. However, in smaller organizations or prototype shops the designer may be responsible for the whole process, in which case it is useful to be able to merge the supplier part number data with the rest of the library data

TYPICAL SOURCES OF COMPONENT DATA

Component data by itself is diverse when you look at all related information associated with the parts themselves. Therefore, their sources may be varied in nature as well. For example component data can include:

- General component data such as internal corporate part numbers, descriptors for the part (i.e. description, package type, etc.) and company-specific data (i.e. project approvals, APL, obsolescence indicators, etc.). This general component data may be sourced within the library environment, a Component Information System (CIS), or an ERP system such as SAP.
- Detailed manufacturer data (including technical parametrics, data sheets, manufacturer part number, package details, etc.). Detailed manufacturer data is typically provided by online data sources such as IHS, Silicon Expert, or Digi-Key.
- Supplier data (including supplier names, supplier part numbers, contact names and addresses, and contractual information such as minimum order quantities and lead time information). Supplier data can also correlate specific approved manufacturer part numbers per each supplier part. This type of supplier data is company-specific and would typically be managed in an ERP system such as ORACLE or SAP.

EXCHANGING GENERAL COMPONENT DATA VIA EDX

To make general component data available to the designer, the ERP or CIS provider can create an EDX Component Container Package that includes the data fields that need to be exchanged between the ERP and the library or component system. An example of a general component data packet in EDX is included below. Once the EDX Component Data Package is loaded into the library system the designer may make use of it as part of their component research to find the best part for their design, as shown in the code example below.

```
<?xml version="1.0" encoding="UTF-8"?>
<edx:Parts xmlns:edx="http://www.edx-sa.com/schema/edx1.x" xmlns:ds="http://www.w3.org/2009/xmlnsig#" partition="Capacitors/General Purpose">
  <edx:Part identifier="UID-adc20840-befc-458f-a456-263188fcd2a5"
    partNumber="C1005C0G1H020C" type="Component">
    <edx:CharacteristicList>
      <edx:TextCharacteristic name="Description" value="CAP CER 2PF 50V NP0 0402"
        valueFormat="^(.*)$" />
      <edx:TextCharacteristic name="Capacitance" value="2.0pF" valueFormat="^(.*)$" />
      <edx:TextCharacteristic name="Voltage Rated" value="50V" valueFormat="^(.*)$" />
      <edx:TextCharacteristic name="Tolerance" value="0.25pF" valueFormat="^(.*)$" />
      <edx:TextCharacteristic name="Mounting Type" value="Surface Mount, MLCC"
        valueFormat="^(.*)$" />
      <edx:TextCharacteristic name="Operating Temperature" value="-55C ~ 125C"
        valueFormat="^(.*)$" />
    </edx:CharacteristicList>
  </edx:Part>
</edx:Parts>
```

EXCHANGING MANUFACTURER DATA VIA EDX

To incorporate manufacturer part data for users, the data supplier should create an EDX Component Container Package that includes their description of the part and classification, including its technical parameters and any related data sheets. In EDX the manufacturer data is contained in a part of type Manufacturer Part. Example code of a Manufacturer Part definition is included below.

```
<?xml version="1.0" encoding="UTF-8"?>
<edx:Parts xmlns:edx="http://www.edx-sa.com/schema/edx1.x" xmlns:ds="http://www.
w3.org/2009/xmlns#sig#" partition="Capacitors">
  <edx:Part identifier="UID-adc20840-befc-458f-a456-263188fcd2a5"
partNumber="C1005C0G1H020C" type="ManufacturerPart">
    <edx:CharacteristicList>
      <edx:TextCharacteristic name="Manufacturer Name" value="TDK Corporation"
valueFormat="^(.*)$" />
      <edx:TextCharacteristic name="Product Description" value="CAP CER 2PF 50V NP0
0402" valueFormat="^(.*)$" />
      <edx:TextCharacteristic name="Category" value="Capacitors"
valueFormat="^(.*)$" />
      <edx:TextCharacteristic name="Datasheet Name" value="C Series General App"
valueFormat="^(.*)$" />
      <edx:TextCharacteristic name="Datasheet URL" value="http://www.tdk.com/pdf/
general_B11.pdf" valueFormat="^(.*)$" />
      <edx:TextCharacteristic name="Capacitance" value="2.0pF" valueFormat="^(.*)$" />
      <edx:TextCharacteristic name="Voltage Rated" value="50V" valueFormat="^(.*)$" />
      <edx:TextCharacteristic name="Tolerance" value="0.25pF" valueFormat="^(.*)$" />
      <edx:TextCharacteristic name="Mounting Type" value="Surface Mount, MLCC"
valueFormat="^(.*)$" />
      <edx:TextCharacteristic name="Operating Temperature" value="-55C ~ 125C"
valueFormat="^(.*)$" />
      <edx:TextCharacteristic name="Applications" value="General Purpose"
valueFormat="^(.*)$" />
    </edx:CharacteristicList>
    <edx:OrganizationReference reference="UID-e8d47b08-3d5d-44cb-a9ac-b800caaca96e"
manifestRefId="UID-e8d47b08-3d5d-44cb-a9ac-b800caaca97e" />
  </edx:Part>
</edx:Parts>
```

Along with the manufacturer part information, it is necessary to supply the definition of the manufacturer. This definition allows the designer to know which manufacturer provided the part data by supplying more than just a name. In the ECAD system the combination of the manufacturer's part number and the manufacturer's name is used to uniquely identify the manufacturer part. The example below illustrates the definition of an example manufacturer.

```
<?xml version="1.0" encoding="UTF-8"?>
<edx:Organizations xmlns:edx="http://www.mentor.com/EnterpriseDataExchangeXMLSchema"
xmlns:ds="http://www.w3.org/2009/xmlns#sig#" partition="DeviceManufacturers">
  <edx:Organization identifier="UID-e8d47b08-3d5d-44cb-a9ac-b800caaca96e" name="TDK
Corporation" webAddress="http://www.tdk.com">
  </edx:Organization>
</edx:Organizations>
```

In EDX it is important to provide a clear and unambiguous component description that is easily understood by designers as well as consistently interpreted by computer systems. The use of IEC 61360 for capturing the classification scheme and data dictionary is recommended but is not mandatory since EDX supports a characteristic definition that uses a description field to aid the end user's interpretation of the data.

IEC 61360, The IEC Component Data Dictionary, contains the IEC reference collection of classes and associated characteristic properties for electric/electronic components and materials used in the design of electronic systems. This data dictionary includes:

- A hierarchical classification of components in a classification tree
- A set of characteristic properties associated with each class that fully describe components belonging to that class
- Where relevant, conditions or value ranges for which the property values are valid.

After the EDX package is created, it is important to add a signature. This signature can be used throughout the supply chain to confirm the source of the data and ensure security.

ADDING SUPPLIER DATA VIA EDX

Supplier data should be added to a Part of type Supplier Part in EDX. A code example of a Supplier Part definition is included below.

```
<?xml version="1.0" encoding="UTF-8"?>
<edx:Parts xmlns:edx="http://www.mentor.com/EnterpriseDataExchangeXMLSchema"
  xmlns:ds="http://www.w3.org/2009/xmlsig#" partition="Capacitors">
  <edx:Part identifier="UID-adc20840-befc-458f-a456-09102b30456f" partNumber="445-
    4863-S-ND" type="SupplierPart">
    <edx:CharacteristicList>
      <edx:IntegerCharacteristic name="Quantity Available" value="180000"/>
      <edx:TextCharacteristic name="Vendor ID" value="445" valueFormat="^(.*)$" />
      <edx:IntegerCharacteristic name="Min Qty" value="10000" />
      <edx:DecimalCharacteristic name="Min Price" value="0.00462"
        unitOfMeasure="USD" />
      <edx:TextCharacteristic name="Sales Status" value="1" valueFormat="^(1|2|3)$" />
    </edx:CharacteristicList/>
    <edx:OrganizationReference reference="UID-e8d47b08-3d5d-44cb-a9ac-b800caaca96e"
      manifestRefId="UID-e8d47b08-3d5d-44cb-a9ac-b800caaca97e" />
  </edx:Part>
</edx:Parts>
```

Along with the supplier part definition, it's necessary to provide the definition of the supplier. This supplier definition includes a detailed description of the supplier that enables the end user to identify the source of the data. In the ECAD system the combination of the supplier's part number and the supplier's name is used to uniquely identify the supplier part. The example code illustrates the definition of an example supplier.

```
<?xml version="1.0" encoding="UTF-8"?>
<edx:Organizations xmlns:edx="http://www.mentor.com/EnterpriseDataExchangeXMLSchema"
  xmlns:ds="http://www.w3.org/2009/xmldsig#" partition="DeviceManufacturers">
  <edx:Organization identifier="UID-e8d47b08-3d5d-44cb-a9ac-b800caaca96e" name="RS
    Components Ltd" webAddress="http://uk.rs-online.com/web/">
  </edx:Organization>
</edx:Organizations>
```

Then they would add the Manufacturer's EDX Packages (per above description) to the supplier part number that they just created as "component files". When the EDA user receives the EDX package they would be able to extract these sub-packages that contain the manufacturer's part number data and load them into their EDA environment using the regular EDX readers. This example shows the part definition that was included earlier with the additional "Attachment" tag that's required to associate an additional file.

```
<?xml version="1.0" encoding="UTF-8"?>
<edx:Parts xmlns:edx="http://www.mentor.com/EnterpriseDataExchangeXMLSchema"
  xmlns:ds="http://www.w3.org/2009/xmldsig#" partition="Capacitors">
  <edx:Part identifier="UID-adc20840-befc-458f-a456-09102b30456f" partNumber="445-
    4863-S-ND" type="SupplierPart">
    <edx:CharacteristicList>
      <edx:IntegerCharacteristic name="Quantity on Hand" value="180000"/>
      <edx:TextCharacteristic name="Vendor ID" value="445" valueFormat="^(.*)$/>
      <edx:IntegerCharacteristic name="Min Qty" value="10000"/>
      <edx:DecimalCharacteristic name="Min Price" value="0.00462"
        unitOfMeasure="USD"/>
      <edx:TextCharacteristic name="Sales Status" value="1" valueFormat="^(1|2|3)$/>
    </edx:CharacteristicList/>
    <edx:OrganizationReference reference="UID-e8d47b08-3d5d-44cb-a9ac-b800caaca96e"
      manifestRefId="UID-e8d47b08-3d5d-44cb-a9ac-b800caaca97e"/>
    <edx:Attachment fileReference="UID-e8d47b08-3d5d-44cb-a9ac-b800caaca95e"/>
  </edx:Part>
</edx:Parts>
```

And this example below shows the "Component Files" tag that's used to reference the attachment from the part with the actual file contained in the archive.

```
<edx:ComponentFiles type="Other">
  <edx:File identifier="UID-e8d47b08-3d5d-44cb-a9ac-b800caaca95e" name="capacitor.
    edx" type="EDX" refId="UID-a19f5437-089a-4af1-9506-7a86d179e7f0" digest="aadebf1b1
    fbe5668404eb7f5050e838f2ca2db8df0e6f33660fa35ed85fe0880" modificationDate="2012-
    06-01T15:33:03" size="648"/>
</edx:ComponentFiles>
```

SUMMARY

Once any of the respective EDX package definitions are complete and respective readers or writers are established, web services can be utilized to establish ongoing updates of the component data with the library environment.

By basing any of the component data exchanges on the EDX format, on-going development and upgrade of each of the respective enterprise tools can occur in an independent fashion while minimizing the impact to the established interface itself. This ultimately minimizes the on-going maintenance of the interface and minimizes company pain as systems are upgraded.

Ensuring that the designer has the latest up-to-date component data at their fingertips helps to improve the both the efficiency and accuracy of their component research. Exchanging EDX component data between systems can bring significant value to this process.

REFERENCES

For more information about the EDX format and how to create EDX Packages please consult the following documentation, available at www.edx-sa.com:

- EDX Format Specification
- EDX Toolkit

For the latest product information, call us or visit: www.edx-sa.com

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