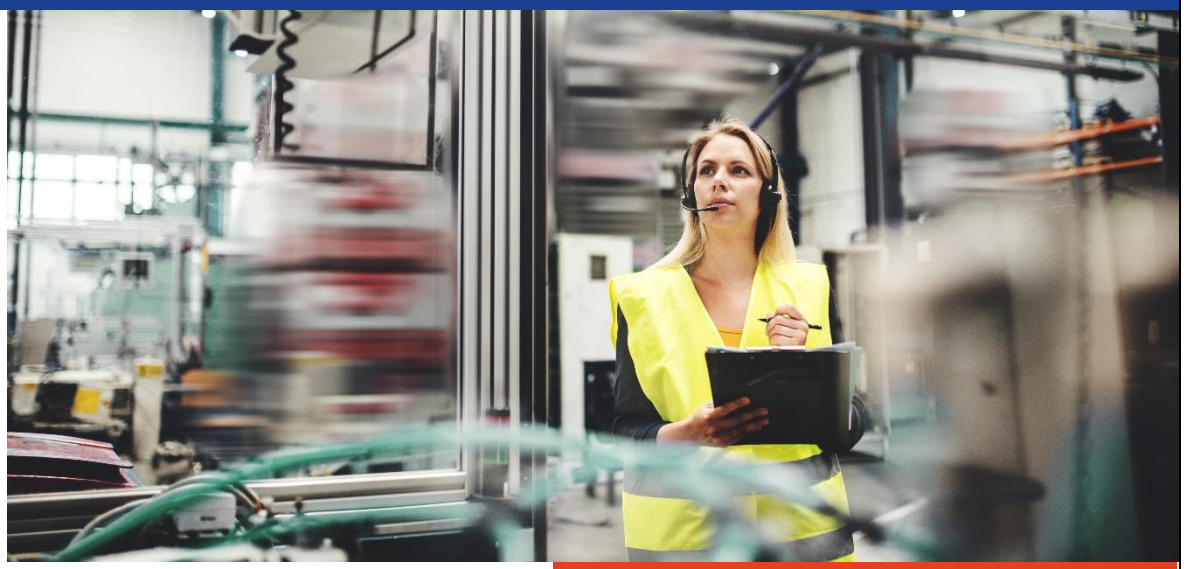
INFORMATION SYSTEMS ENGINEERING, INC.

ISE Unique Item Generation Application

General Information Manual



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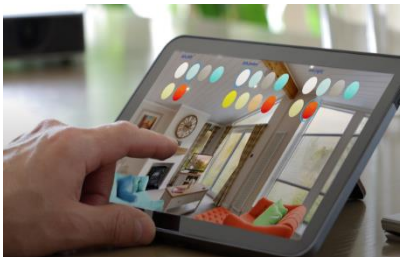
What is Infor CPQ?



Infor Configure Price Quote (CPQ) is a state-of-the-art product configurator that integrates with many Infor ERP software packages, including Infor XA. Much more than a tool to simply select features and options, Infor CPQ allows complex engineering and manufacturing rules to be stored to drive a configuration process where the configuration options are constantly being validated. Infor CPQ provides users with a rich graphical user interface and generates configurations for quotes and customer orders that include a configured price, a full bill of material, a list of routing operations, optional dynamically-generated "as-configured" drawings in 2D or 3D, and an impressive collection of proposal packages. Infor CPQ has been described by a top discrete manufacturer as "an enterprise CPQ solution that is the best in the market for discrete manufacturers."

Why the Need for the ISE Unique Item Generation Application?

Infor XA, of course, is itself a very mature and robust ERP software package with a very flexible Enterprise Product Data Management (EPDM) application that fully supports site-level control, revision-level control, effectivity dates, alternate bills of material, alternate routings, etc. for items. The flexible XA EPDM engineering database can accommodate the multitude of various configuration combinations that can be produced for configurable items by a product configurator such as Infor CPQ. Infor CPQ is, in fact, the fourth generation of product configurator tools that have either been built into XA or have interfaced with XA, all the way from the original XA Features and Options, to the green-screen KBC configurator, to the graphical Advanced Product Configurator, and now to the state-of-the-art Infor CPQ.

The normal process flow that exists within the interface between the Infor CPQ Configurator and Infor XA involves the creation of a new XA EPDM item process record for each unique configuration of a configured item. Every configured line item entered on a Quote or Customer Order ends up either producing a new item process record or updating an existing item process record. Each of these item process records references a unique combination of a bill of material and a routing that are linked back to a user's responses to the various questionnaire options in a CPQ Configurator session. This flow from a user's responses in a CPQ session to an XA EPDM item process record linked to a bill of material and a routing is a point-to-point interface between CPQ and XA that utilizes standard IBM System i interface tables and XA System-Link processing running in a special configurator unattached job.

An astute reader will have noticed the repeated reference to XA EPDM Item Process records

in the above paragraph, and this is indeed an accurate observation. Infor's "vanilla" CPQ to XA interface ends with the creation or updating of an XA EPDM item process record, along with the associated bill of material and routing. But many XA customers desire, and even expect, the CPQ-to-XA interface to go further and generate a unique item revision record for each unique configuration. But the existing interface stops at the item process level.

Why is the lack of unique item records such an important issue? Besides being linked to a bill of material and a routing, XA EPDM configured item processes contain a configured price, configured cost elements and a configured description, all of which are necessary. There are, however, many, many other attributes associated with an EPDM item revision record that are cannot be included in item process records. One such example would be the "Unit weight" field that is stored at the XA item revision level. XA uses the value in this field when accumulating a total weight for a customer order or quote, and this total order weight is usually very important when calculating freight rates. CPQ rule sets can be set up to incorporate the ability to accumulate a unit weight for a configuration. But there is nowhere in "vanilla" XA to store that configured unit weight at an item process level. As KB article 798300 on the Infor Support Portal states, prices and costs are rolled up for configured items, but not weights. And this is just one example illustrating why most XA customers using the CPQ configurator have a strong preference for unique item revision records being created, instead of the current model where only unique item process records are created. Other examples where a CPQ configuration can generate useful field values that exist only at the XA item revision level are unit volume, height, length, width, item class, item accounting class, item sales group, value class, engineering drawing number, stocking location, department number, the two extra item description fields, etc.

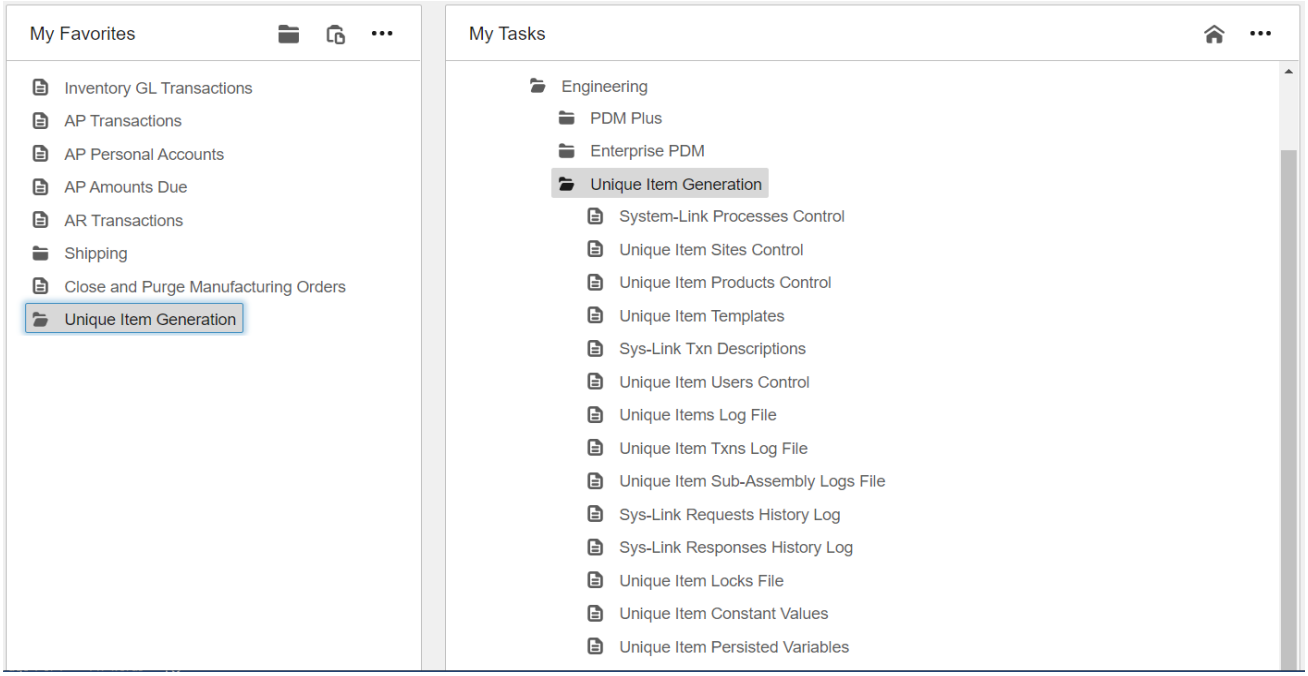
In addition, if unique item revision records are generated for each unique CPQ configuration, that allows for the creation of XA item warehouse records for each unique item revision record, and all of the stocking, planning, scheduling, cycle-counting, and sales fields belonging to an XA item warehouse can be populated differently for each unique item according to an enterprise's business logic. On top of all this, values in both XA user fields and in custom extension file fields at the XA enterprise item, item revision, item revision base price, and item warehouse levels can also be populated on an item-by-item basis per the enterprise's business logic.

Overview of the UIG Application

ISE's "Unique Item Generator" (i.e. "the UIG") application loops through all the line item records on a customer order (or a customer quote), replacing each line item containing a configured item process with a line item containing a unique item revision. These new unique item revisions will retain all the characteristics of the original configured item process and are fully functional item revisions inside XA. All the required underlying EPDM, MM and CSM records required for the unique item revision and the new customer order line item are automatically created. The item numbering scheme for the new unique item revision records is flexible and can be set up to accommodate your company's needs.

Fourteen custom integrator primary business objects, plus other associated secondary and text business objects are the backbone of the UIG application. These custom business object allow for UIG application configuration, CPQ interface configuration, UIG runtime control and UIG detailed logging. All XA record processing (i.e. creating, updating, and deleting records) carried out by the UIG is done through XA System-Link, so that all of XA's built-in business

logic edits and security are fully honored. The UIG does not perform any record processing that is not available to a user via standard XA IDF Level 2 functionality in Power-Link and Net-Link. A listing of the fourteen UIG primary business objects is shown below:



The UIG functionality can be summarized in this way:

- The UIG functionality is designed to complement and enhance the interface between the Infor CPQ Configurator and the Infor XA ERP system.
- Going beyond the “vanilla” interface between CPQ and XA, the core functionality of the UIG replaces configured line items on XA Customer Orders and Quotes with line items containing a unique non-configured item revision.
- The unique non-configured item revisions are similar to the configured items processes they replace, using the same bill of material and routing generated by the CPQ configuration process for the configured item process.
- Along with configured end items, the UIG can also be tailored to generate unique item revisions for each unique item process for configured sub-assemblies.
- The UIG contains multiple options to tailor the application, and these options exist at the application level, the XA site level, the XA product level and the XA user level.
- The UIG contains multiple business objects capturing logging information to make any required analysis or troubleshooting as easy and straightforward as possible.

XA System Requirements for the UIG Application:

- Customer Service Management (CSM)
- Enterprise Product Data Management (EPDM)
- Materials Management (MM)
- Integrator (Enterprise Integrator preferred)
- System-Link
- Interface to Infor CPQ

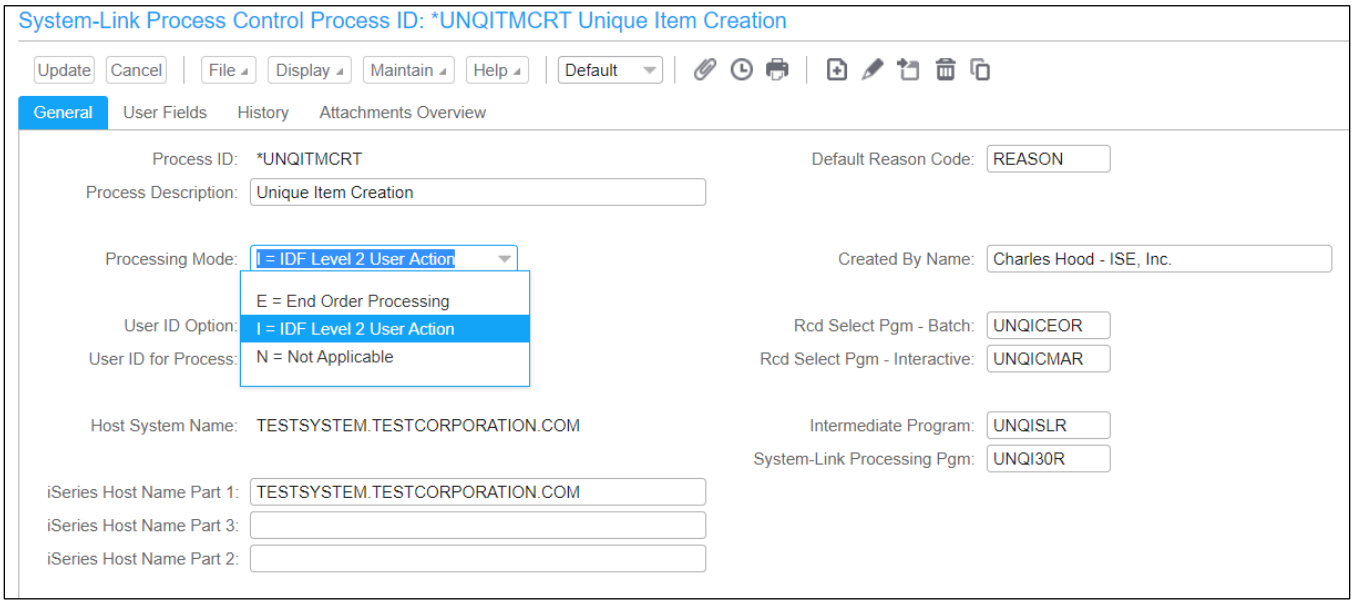
A Guided Tour of the UIG Application

As mentioned previously, the fourteen UIG business objects provide four general areas of functionality:

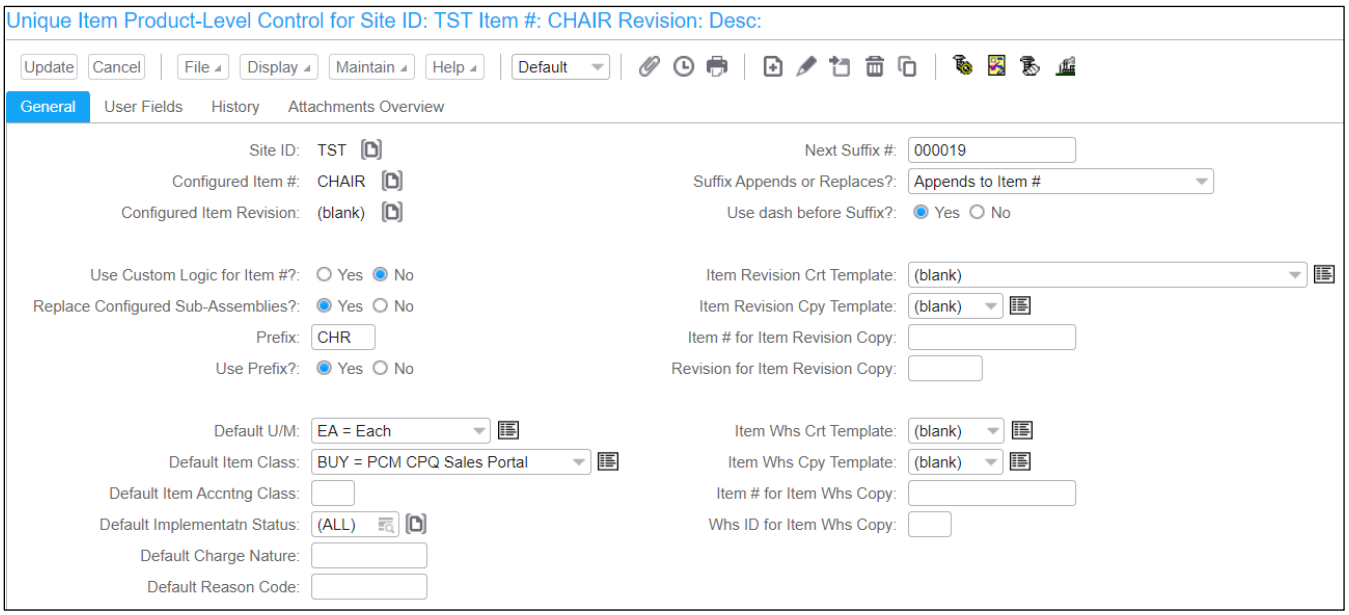
- UIG Application Configuration
- CPQ Interface Configuration
- UIG Runtime Control
- UIG Detailed Logging

Each of these four functional areas will be discussed further, with supporting screen captures included to help illustrate the functionality.

UIG Application Configuration – The UIG is a very flexible and customizable application. Customizable options exist at the application level to provide the UIG's behind-the-scenes System-Link processing with all the setup information that XA System-Link requires. Also at the application level is a very important setting which controls the mode in which the UIG is run. In Automatic ("End Order") mode, the UIG functionally runs automatically using program calls from the XA "End Order" user exit, whenever the XA "End Order" process is invoked by Customer Order or Quote creation or maintenance. If this mode is selected, and a Customer Order or Quote contains at least one configured line item, and the "End Order Processing" option has been checked, the UIG processing should take place automatically, with no user intervention required. In IDF Level 2 "User Action" mode, users are required to select a "Mass Action" option from a custom "User" menu or "Smart Icon" after an order or quote has been created or updated. This menu option exists on both the "Line Items" list view screen showing the line items for a Customer Order or Quote, and also on the card file screen showing the details for a Customer Order or Quote line item. It should be noted that this "IDF Level 2 User Action" mode is always available if needed. The following screen capture illustrates typical values found in the UIG application-level control file:



Other UIG application configuration business objects exist to allow for flexible configuration at the XA Site level and the XA Product level. Default values for important XA item revision and item warehouse fields can be entered at both the XA Site level and the XA Product (i.e. configurable item) level. Another very powerful feature supported at these two levels is the ability to enter the names of IDF Level 2 create templates or copy templates that will be used when the UIG is creating new item revision and new item warehouse records. Since templates possess the ability to store a lot of business logic, being able to specify these templates makes the UIG application very flexible and very customizable. The following screen capture illustrates the options available at the Site level, including the ability to specify the names of a specific create templates and specific copy templates:



The last main UIG application configuration business object exists at the User level. This business object controls which of the two modes the UIG runs in for a particular user id (i.e. either Automatic (“End Order”) mode or IDF Level 2 “User Action” mode), along with specifying which job queue is associated with a user id for any necessary UIG-related batch-mode processing.

CPQ Interface Configuration – Two UIG business objects exist that have the ability to utilize any custom values passed from the CPQ Configurator to the IBM System i interface tables. Such custom values can either be global constant values that apply to all configured end items or all configured sub-assemblies, or they can be variable values that differ for each unique configuration. Utilizing these constant values and variable values really opens up and extends the CPQ-to-XA interface, as it allows any data necessary for a particular enterprise to be generated by the CPQ rule sets and passed to the UIG. The following screen capture shows sample data for the UIG “Unique Item Constant Values” business object:

Unique Item Constant Values

File | Display | Maintain | Help

Transaction ID	Rec Seq #	Property Description	Related Object?	Related Object Identifier	Property Name	Property Value	Custom Logic?
RCEI - CRTITMRVSN	6	Stocking Unit of Measure	No		stockingUm	EA	No
RCEI - CRTITMRVSN	7	Weight Unit of Measure	No		weightUm	LB	No
RCEI - CRTITMRVSN	8	Cost Technique Code to Use Routing	Yes	ItemRevisionCost	costTechniqueCode	R	No
RCEI - CRTITMRVSN	9	Standard Lot Size	Yes	ItemRevisionCost	standardLotSize	1.000	No
RCEI - CRTITMRVSN	10	Item Class	No		itemClass	6000	No
RCEI - CRTITMRVSN	11	Item Accounting Class	No		itemAccountingClass		No
RCEI - CRTITMWHS	1	Cycle Count Class	No		cycleCountClass	C	No
RCEI - CRTITMWHS	2	Cycle Count Tolerance Percent	No		countAccuracyTolerancePercent	5.0	No
RCEI - CRTITMWHS	4	Fixed Order Quantity	No		fixedOrderQuantity	0	No
RCEI - CRTITMWHS	5	Floor Stock Code	No		floorStockCode		No
RCEI - CRTITMWHS	6	Label Code	No		userFieldCodeA	W	No
RCEI - CRTITMWHS	7	Lead Time Code	No		leadTimeCode	M	No
RCEI - CRTITMWHS	8	Mfg ABC Code	No		userFieldCodeB	D	No
RCEI - CRTITMWHS	9	Order Point	No		orderPoint	0	No
RCEI - CRTITMWHS	10	Order Policy Code	Yes	ItemPlan	orderPolicyCode	G	No

UIG Runtime Control – The one UIG runtime control business object is the “Unique Item Locks File”. This business object provides a quick and easy way for a user to remove a UIG lock placed on a customer order or quote by the UIG. Typically, such locks are never seen, but they can show up during the early implementation and testing phases when certain CPQ, XA and UIG integration issues still need to be discussed and ironed out.

UIG Detailed Logging – The UIG provides five business objects that log all the UIG’s activity. The main UIG log is contained in the “Unique Items Log File” business object. This log file contains one record for every configured customer order or quote line item that was processed by the UIG in an attempt to convert that line item to a new line item containing a unique item revision. If any of the UIG System-Link processing for that line item does not succeed, the errors are fetched from the XA System-Link responses and prominently displayed. Otherwise, the fact that all the System-Link processing completed successfully is logged and displayed. A sample of this log file is shown below:

Unique Items Log File

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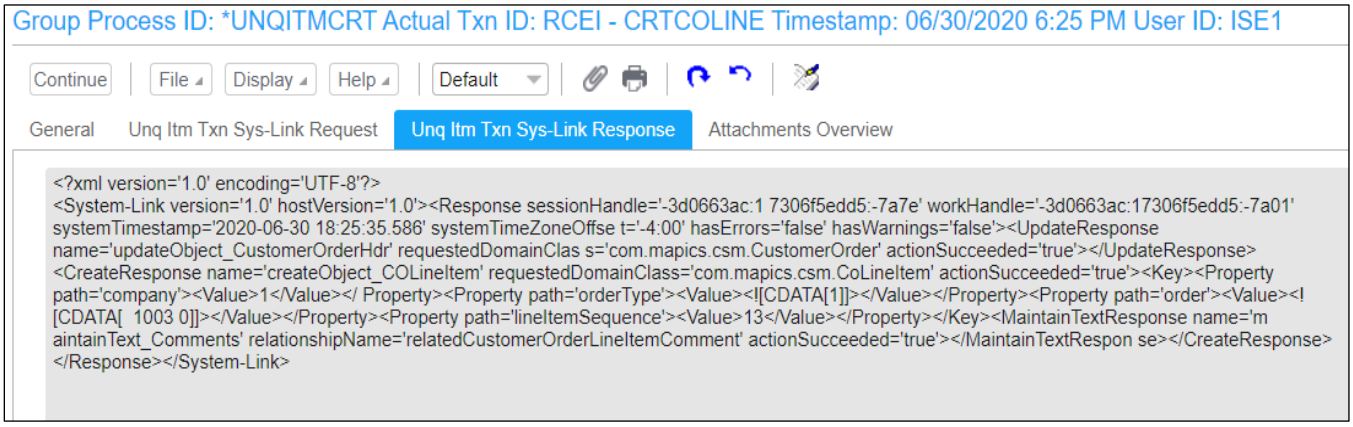
Process Date	Process Time	User ID	Process Name	Co #	Ord Hdr Type	C.O./Quote #	C.O./Quote Line Item #	High-Level Error?	Lock Error?	Site ID	Configured Item #	Configured Item Revision	Config ID
09/09/2020	1:01:20 PM	ISE2	*UNQITMCRT	1	Customer Order	10047	1	No	No	TST	CHAIR		21
09/09/2020	12:28:32 PM	ISE2	*UNQITMCRT	1	Customer Order	10046	1	No	No	TST	CHAIR		21
09/09/2020	11:39:59 AM	ISE2	*UNQITMCRT	1	Customer Order	10045	1	No	No	TST	CHAIR		21
09/09/2020	11:24:27 AM	ISE2	*UNQITMCRT	1	Customer Order	10041	2	No	No	TST	CHAIR		21
09/09/2020	11:16:43 AM	ISE2	*UNQITMCRT	1	Customer Order	10038	32	No	No	TST	CHAIR		10
09/09/2020	11:15:51 AM	ISE2	*UNQITMCRT	1	Customer Order	10038	33	No	No	TST	CHAIR		10
09/09/2020	11:07:13 AM	ISE2	*UNQITMCRT	1	Customer Order	10038	34	No	No	TST	CHAIR		10
07/01/2020	9:09:59 AM	ISE1	*UNQITMCRT	1	Customer Order	10030	36	No	No	TST	CHAIR		21
07/01/2020	8:23:30 AM	ISE1	*UNQITMCRT	1	Customer Order	10030	34	No	No	TST	CHAIR		21
06/30/2020	7:58:37 PM	ISE1	*UNQITMCRT	1	Customer Order	10030	31	No	No	TST	CHAIR		21
06/30/2020	7:58:28 PM	ISE1	*UNQITMCRT	1	Customer Order	10030	30	No	No	TST	CHAIR		21
06/30/2020	7:54:59 PM	ISE1	*UNQITMCRT	1	Customer Order	10030	28	No	No	TST	CHAIR		21
06/30/2020	7:52:41 PM	ISE1	*UNQITMCRT	1	Customer Order	10030	26	No	No	TST	CHAIR		21
06/30/2020	7:50:26 PM	ISE1	*UNQITMCRT	1	Customer Order	10030	24	No	No	TST	CHAIR		21
06/30/2020	7:48:08 PM	ISE1	*UNQITMCRT	1	Customer Order	10030	22	No	No	TST	CHAIR		21
06/30/2020	7:41:41 PM	ISE1	*UNQITMCRT	1	Customer Order	10030	20	No	No	TST	CHAIR		21
06/30/2020	7:36:28 PM	ISE1	*UNQITMCRT	1	Customer Order	10030	18	No	No	TST	CHAIR		21
06/30/2020	7:19:36 PM	ISE1	*UNQITMCRT	1	Customer Order	10030	16	No	No	TST	CHAIR		21

The data for every specific System-Link transaction performed by the UIG can be found in the “Unique Item Txns Log File” business object. And each record in this business object ties to a

set of related records in the “Sys-Link Requests History Log” and the “Sys-Link Responses History Log” business objects. These two System-Link logging files contain the actual XML supplied by the UIG for each System-Link Request, along with the XML response received from XA System-Link for each request. These two System-Link XML logging files provide information for troubleshooting and analysis that is as granular as it possibly can be. Any issues encountered by XA System-Link for any of the steps in the UIG processing will be captured in these two files. Below is a sample of the XML that can be seen in the “Sys-Link Response History Log” (notice that in this sample XML all processing was successful):



If a lot of customer order or quote configured line items are processed by the UIG, these log files can grow to very large sizes. In order to prevent any possible disk space issues, functionality to periodically purge old records from these UIG log files and reclaim the deleted records has been provided within the UIG. This record purging can be initiated from the UIG business objects via the supplied “Host Job” options, or the underlying programs can be set up in the system job scheduler to run on predetermined days at predetermined times.

IDF Level 2 “User Action” Mode

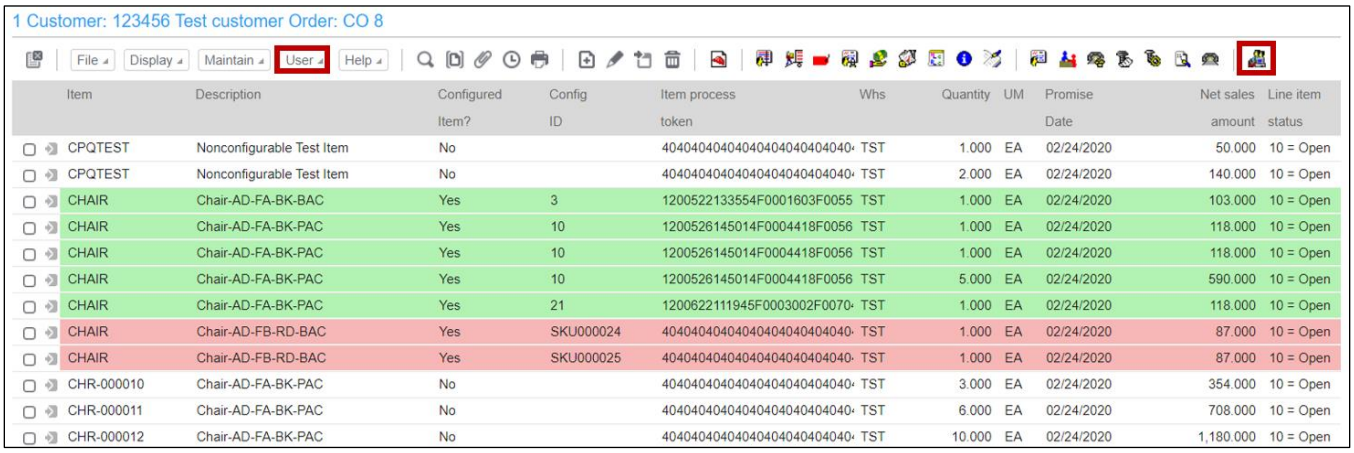
Besides the fourteen primary business objects visible from the main screen in Power-Link or Net-Link, and all the other associated secondary and text business objects, the two other places where the UIG is visible in Power-Link or Net-Link are two IDF Level 2 “User Actions” that are supplied for the XA “C.O. Line Item” and “Quote Line Item” business objects. A new menu option on the “User” menu will appear as part of the XA “C.O. Line Item” and “Quote Line Item” business objects, and the text for this user menu option will state “Create Unique Items”. In addition, a new “Smart Icon” will appear that will perform the same functionality as the user menu option.

Clicking on either this user menu option or the smart icon will initiate the UIG processing. If the user has specifically highlighted a set of records, or if the user has applied a subset, the UIG processing will only run for the highlighted records or the records in the subset. If the user has not highlighted any records and has not specified a subset, then all the line items for the customer order or quote will be processed by the UIG processing. The UIG processing first edits all the records that it is going to process, looking only for line items for configured items where the full integration between CPQ and XA EPDM has been completed. For a line item to be processed by the UIG, the following must be true:

1. The item referenced on the line item must be set up in XA EPDM as an item revision that “Requires configuration” by the “Product Configuration Management version 7+” configurator (this was the previous name for the CPQ configurator).

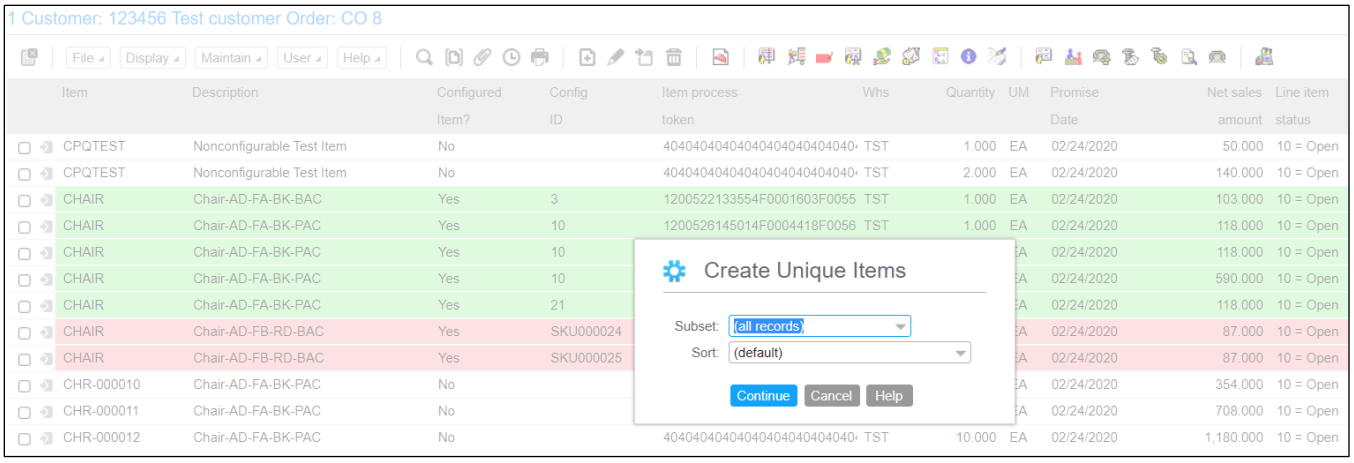
2. The line item must be populated with a valid XA EPDM “Configuration ID”, as opposed to a temporary “SKU number” that is assigned by CPQ as a temporary placeholder.
3. The line item must be populated with a valid, non-blank, EPDM item process token. This is required because the combination of a valid EPDM “Configuration ID” and a non-blank EPDM item process token are the guarantees that the CPQ and XA EPDM interface processing has truly completed for a particular line item.

The following screen capture shows the location of the “Smart icon” to initiate UIG processing, along with the location of the “User” menu that contains the option to initiate UIG processing. Both the “Smart icon” and the “User” menu are enclosed in a red squares or rectangle:



Item	Description	Configured Item?	Config ID	Item process token	Whs	Quantity	UM	Promise Date	Net sales amount	Line item status
CPQTEST	Nonconfigurable Test Item	No		4040404040404040404040404040	TST	1.000	EA	02/24/2020	50.000	10 = Open
CPQTEST	Nonconfigurable Test Item	No		4040404040404040404040404040	TST	2.000	EA	02/24/2020	140.000	10 = Open
CHAIR	Chair-AD-FA-BK-BAC	Yes	3	1200522133554F0001603F0055	TST	1.000	EA	02/24/2020	103.000	10 = Open
CHAIR	Chair-AD-FA-BK-PAC	Yes	10	1200526145014F0004418F0056	TST	1.000	EA	02/24/2020	118.000	10 = Open
CHAIR	Chair-AD-FA-BK-PAC	Yes	10	1200526145014F0004418F0056	TST	1.000	EA	02/24/2020	118.000	10 = Open
CHAIR	Chair-AD-FA-BK-PAC	Yes	10	1200526145014F0004418F0056	TST	5.000	EA	02/24/2020	590.000	10 = Open
CHAIR	Chair-AD-FA-BK-PAC	Yes	21	1200622111945F0003002F0070	TST	1.000	EA	02/24/2020	118.000	10 = Open
CHAIR	Chair-AD-FB-RD-BAC	Yes	SKU000024	4040404040404040404040404040	TST	1.000	EA	02/24/2020	87.000	10 = Open
CHAIR	Chair-AD-FB-RD-BAC	Yes	SKU000025	4040404040404040404040404040	TST	1.000	EA	02/24/2020	87.000	10 = Open
CHR-000010	Chair-AD-FA-BK-PAC	No		4040404040404040404040404040	TST	3.000	EA	02/24/2020	354.000	10 = Open
CHR-000011	Chair-AD-FA-BK-PAC	No		4040404040404040404040404040	TST	6.000	EA	02/24/2020	708.000	10 = Open
CHR-000012	Chair-AD-FA-BK-PAC	No		4040404040404040404040404040	TST	10.000	EA	02/24/2020	1,180.000	10 = Open

Once either the “Smart icon” or the “Create Unique Items” menu option has been clicked, an IDF Level 2 pop-up window entitled “Create Unique Items” will appear. This pop-up window is asking the user to confirm their choice to initiate the UIG processing, along with asking the user to confirm their choice of subset (if any subset is being applied) and sort (if any sort is being applied). If everything looks correct on this pop-window, the user can simply click on the “Continue” button to continue the UIG processing:



Overview of UIG Functional Highlights

1. *Application configuration:*
   - Flexible options for item-numbering schemes for unique items
   - Option to replace all configured sub-assemblies with unique items
   - All application database tables include a full set of user fields for future customization
   - Easy setup of pre-set constant values to reference when creating or updating unique items
   - Easy setup of pre-set and very dynamic persisted variable values populated by CPQ to reference when creating or updating unique items
   - Easy to incorporate the usage of create templates and copy templates
   - Allows tailoring by user ID
2. *Automated functionality:*
   - Automated creation of all XA EPDM and MM records needed to ensure fully functional unique item revisions and item warehouses
   - Automated XA Cost Roll-Ups for unique item revisions
   - Automated Replacement of the Unit Cost Default with the value in the Standard Unit Cost
3. *Navigation/Logging:*
   - Many useful custom user definitions are included
   - Easy determination of which CPQ configurations have not yet completed the CPQ-to-XA-EPDM processing
   - Very robust logging of all unique-item EPDM, MM and CSM processing that occurs
   - Host Jobs provided to allow purging of the log files
   - Ability to drill-down and copy the full XML statements for all the individual System-Link transactions
4. *Miscellaneous:*
   - Many user exit points are available in the underlying code to allow existing custom programs to be invoked
   - Opens up the CPQ-to-XA interface to transfer much more data from CPQ to XA than the standard interface allows
   - An Application Configuration Guide, an Application User's Guide and training for your staff are all available

Summary

For XA customers who want to integrate Infor XA with the Infor CPQ Configurator product, the ISE UIG application provides a powerful, pre-built, proven and flexible way to overcome the limitations in the "vanilla" CPQ-to-XA interface. This "vanilla" interface stops at the XA EPDM item process level and does not go on to create unique XA item revision records for each unique configuration. The ISE UIG application takes the XA EPDM item process records created by the "vanilla" CPQ-to-XA integration and uses XA System-Link to create fully functional unique XA item revision and item warehouse records for each unique configuration. These unique item revision and item warehouse records can then be planned, manufactured, stocked, transacted and costed just like any other valid item revision and item warehouse records in XA.

The ISE UIG application greatly extends the capabilities of the CPQ-to-XA integration by allowing four different classes of additional interface values: default values at the site and product level, create templates and copy templates at the site and product levels, custom constant values and custom persisted variables. Using the ISE UIG, a lot more data can be passed from CPQ to XA than the base set of data included in the “vanilla” CPQ-to-XA integration. This custom data can end up residing in fields that XA knows about and utilizes in normal XA processing, along with residing in user fields and fields in custom extension files. This allows an opportunity for a great deal of custom business logic to be incorporated into the UIG.

Multiple UIG control files at multiple levels provide a great amount of flexibility regarding exactly how the UIG application will look, the mode in which the UIG will operate, how the unique item numbers will be generated, how configured sub-assemblies will be handled, etc. A robust set of UIG logging files allows for extensive analysis and troubleshooting of the UIG data, right down to the actual XML supplied for all of the UIG-related System-Link requests and responses.

A full set of documentation exists for the UIG application, covering the initial UIG configuration and the day-to-day use of the UIG. Both training and implementation assistance can be provided for your staff.

