Training Guide

QAD Configurator

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QAD Enterprise Applications
Configurator 5.2
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Contents

About This Course

Course Description

This course is designed to cover the basics of using QAD Configurator to configure customizable products to meet specific customers' requirements.

The course includes:

- An introduction to the QAD Configurator product.
- Instructions on how to perform data and system setup prior to using QAD Configurator.
- Instructions on how to implement the sales configuration process.
- Instructions on how to implement the product configuration process.
- Instructions on how to use the guided sales process to configure products.
- Activities and exercises throughout the course (for students to practice key concepts and processes)

Course Objectives

By the end of this class, students should be able to:

- Understanding the underlying key business concepts behind QAD Configurator.
- Use Configurator to customize configurable products.

Audience

The audience for this course includes:

- Engineers
- Customer service representatives
- Implementation consultants
- Members of implementation teams

Prerequisites

The prerequisites for attending this course are:

- Basic knowledge of QAD Enterprise Applications 2010 EE as it is used in the industry today.
- Knowledge of QAD Enterprise Applications product structures and routing functionality
- Working knowledge of the manufacturing industry in general

Note Students unfamiliar with QAD Enterprise Applications 2010 EE should read the *User Interface Guide* before attending this class.

Course Credit and Scheduling

This course is typically taught in four days.

QAD Resources

If you encounter questions or problems on QAD software that are not addressed in this book, several resources are available.

Product Help

All QAD products ship with integrated help systems. A properly installed QAD application will display help when you press the Help key (F1), or access it through the menu. The help covers the normal use of the product.

QAD Web Resources

From QAD's main site, you can access QAD's Learning or Support sites.

http://www.qad.com/

QAD Learning Portal for Training Opportunities

To view available training courses, locations, and materials, use the QAD Learning Portal. Choose Learning under the Global Services tab to access this resource.

QAD Support for Product Documentation and the QAD Knowledgebase

To access release notes, user guides, installation and conversion guides by product and release, visit the Support website. Support also offers an array of tools depending on your company's maintenance agreement with QAD. These include the Knowledgebase and direct links to QAD Support experts.

Choose Support under the Global Services tab.

Any QAD customer can register for a QAD web account by accessing the Support web site and clicking the Accounts link at the top of the screen. Your customer ID number is required. Access to certain areas is dependent on the type of agreement you have with QAD.

Chapter 1

Introduction to QAD Configurator

This chapter will give you a basic understanding of the QAD Configurator product by answering the following questions:

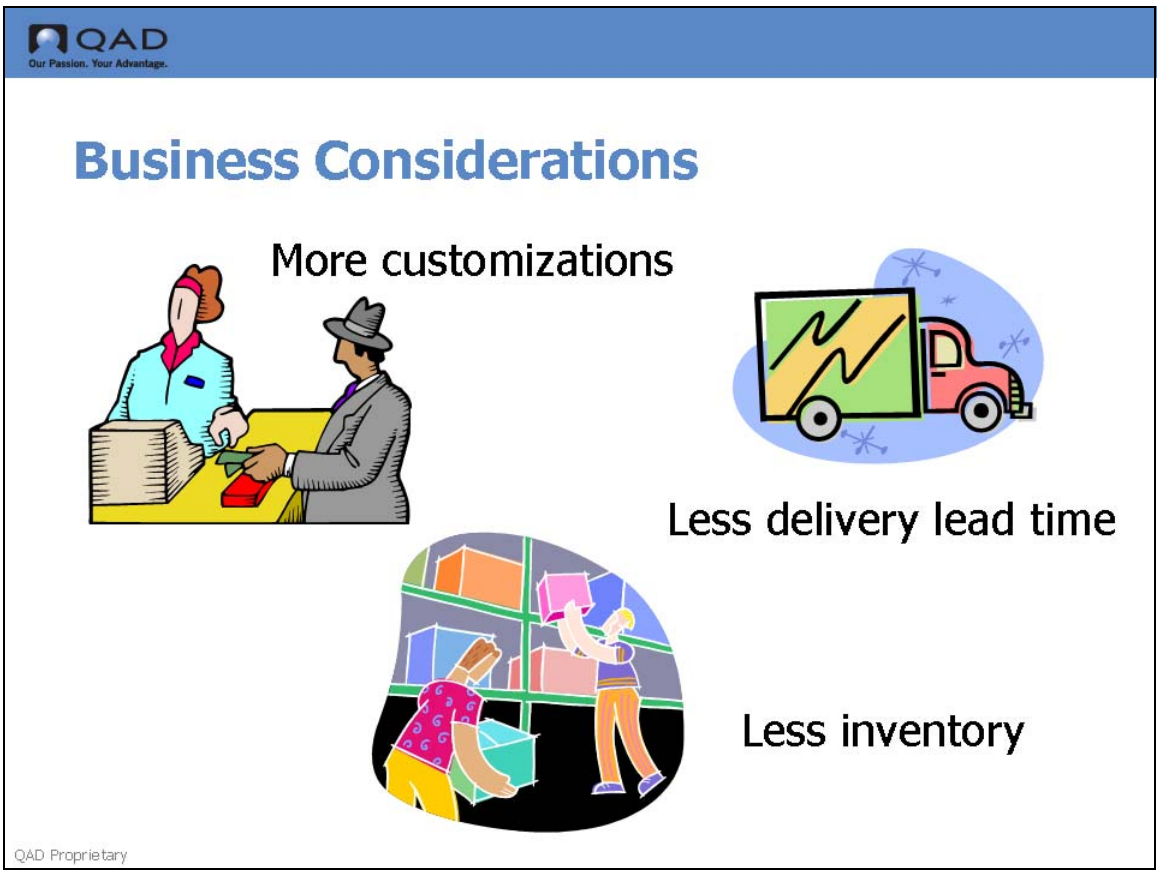
- What is QAD Configurator?
- What does QAD Configurator do?
- What benefits does QAD Configurator provide?
- What manufacturing strategies can QAD Configurator most likely help you implement?
- What is the relationship between QAD Configurator and QAD Enterprise Applications?

We will also take a brief look at the basic workflow of using QAD Configurator and navigate around in the QAD Configurator workspace.

At the end of this chapter, you should be able to:

- Describe the main features of QAD Configurator
- Describe the key benefits of using QAD Configurator
- Identify the manufacturing environments QAD Configurator best works in
- Understand how QAD Configurator is integrated with QAD Enterprise Applications
- Describe the basic Configurator workflow
- Know your way around the QAD Configurator workspace

Business Considerations



In this increasingly competitive market, many manufacturing companies are seeking to address three key issues to increase customer satisfaction and gain a competitive edge:

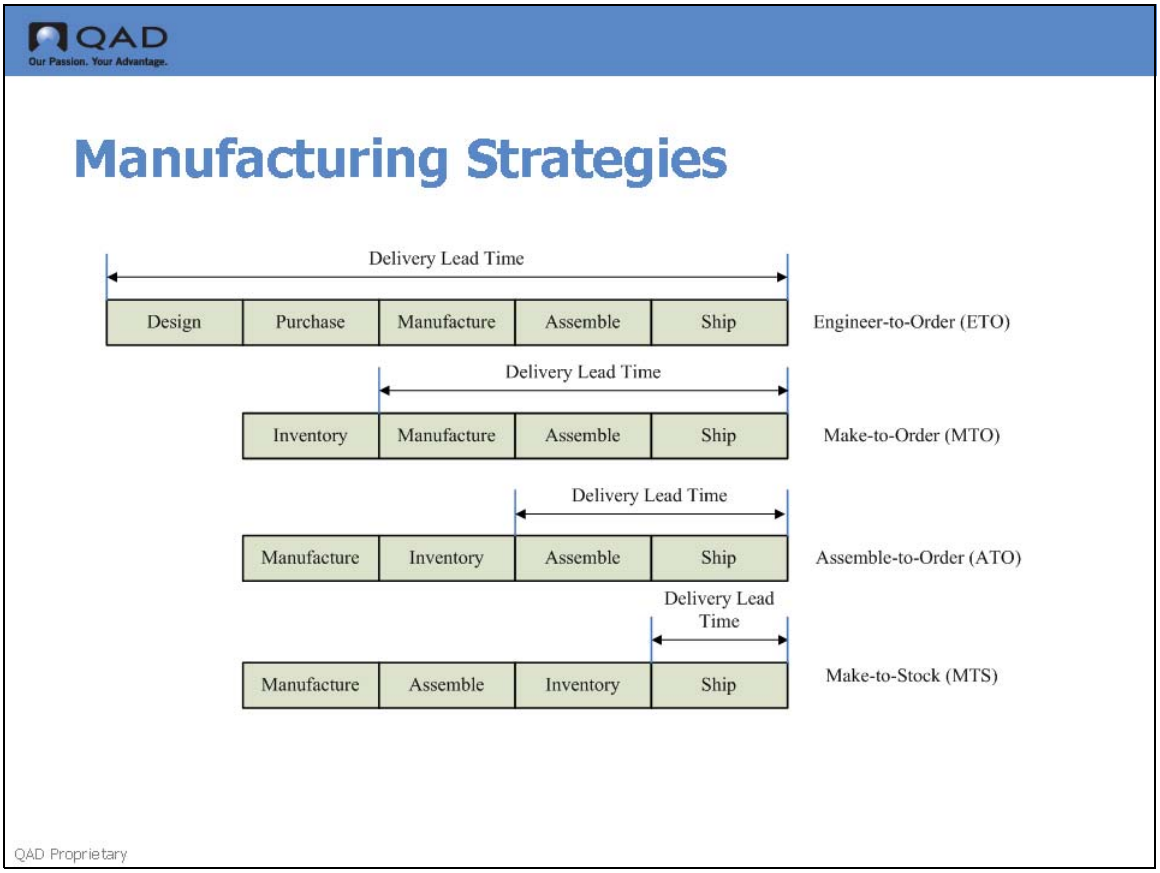
- Meet customers' increasingly varied and personalized demands
- Minimize inventory
- Minimize delivery lead time

To tailor products to customers' needs, a manufacturer must possess the capability and flexibility to accept customized orders and configure products according to specific requirements.

To keep inventory as low as possible, a postponement strategy should be adopted to delay manufacturing or assembling products until customer orders are received.

To shorten delivery lead time, the ability to swiftly convert customers' requirements into manufacturing requirements is crucial.

Manufacturing Strategies



A highly market-oriented company will focus on meeting or exceeding customer expectations. In such a company all functions must contribute toward a winning strategy. Thus, operations must have a strategy that allows it to supply the needs of the marketplace and provide fast on-time delivery.

From the supplier's perspective, delivery lead time is the time from placing an order to the delivery of the product. From the customer's perspective it may also include time for order preparation and transmittal. Customers want delivery lead time to be as short as possible, and manufacturing must design a strategy to achieve this.

There are four basic strategies: engineer-to-order, make-to-order, assemble- to-order, and make-to-stock. Customer involvement in the product design, delivery lead time, and inventory state are influenced by each strategy.

Engineer-to-order means that the customer's specifications require unique engineering design or significant customization. Usually the customer is highly involved in the product design: Inventory will not normally be purchased until needed by manufacturing. Delivery lead time is long because it includes not only purchase lead time, but design lead time as well.

Make-to-order means that the manufacturer does not start to make the product until a customer's order is received. The final product is usually made from standard items but may include custom-designed components as well. Delivery lead time is reduced because there is little design time required and inventory is held as raw material.

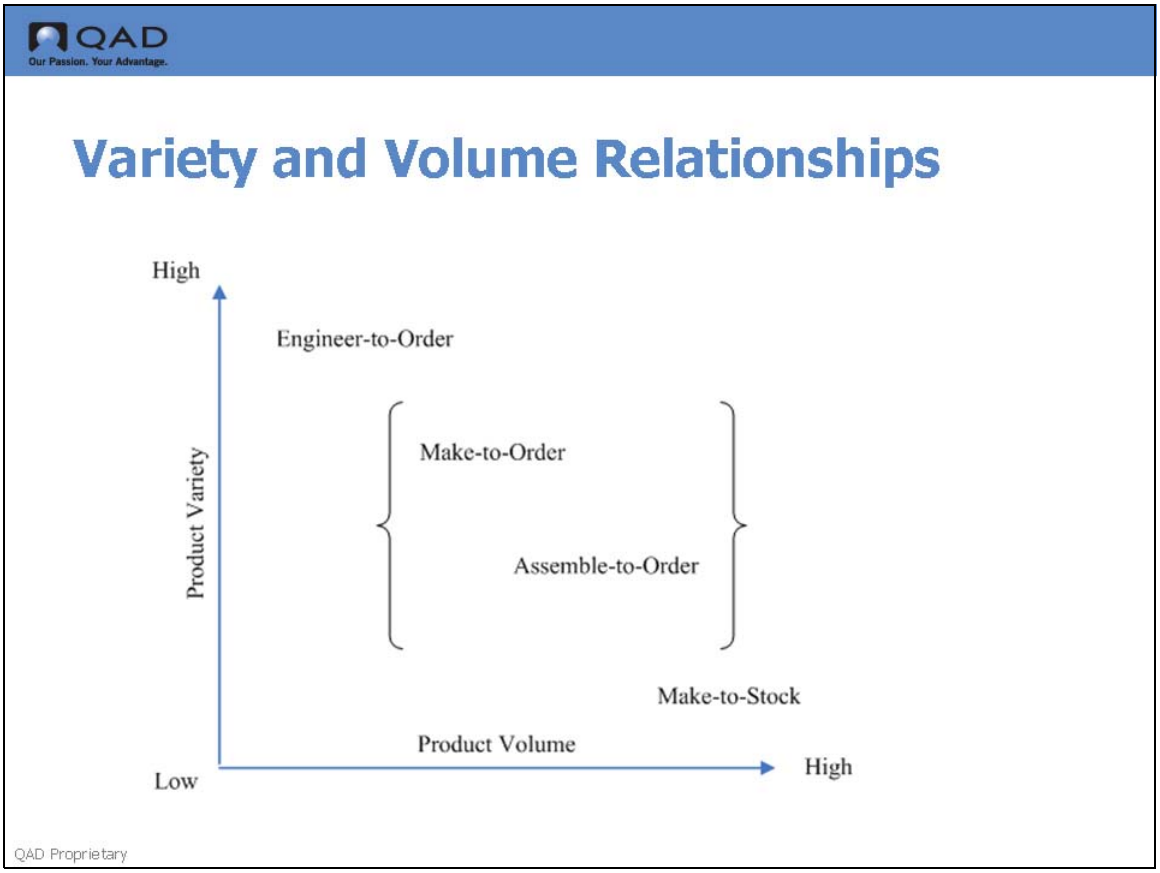
Assemble-to-order means that the product is made from standard components that the manufacturer can inventory and assemble according to a customer order. Delivery lead time is reduced further because there is no design time needed and inventory is held ready for assembly. Customer involvement in the design of the product is limited to selecting the component part options needed.

Make-to-stock means that the supplier manufactures the goods and sells from finished goods inventory. Delivery lead time is shortest. The customer has little direct involvement in the product design.

Question Can you think of some examples for each of these four manufacturing environments?

_____
_____
_____
_____

Variety and Volume Relationships



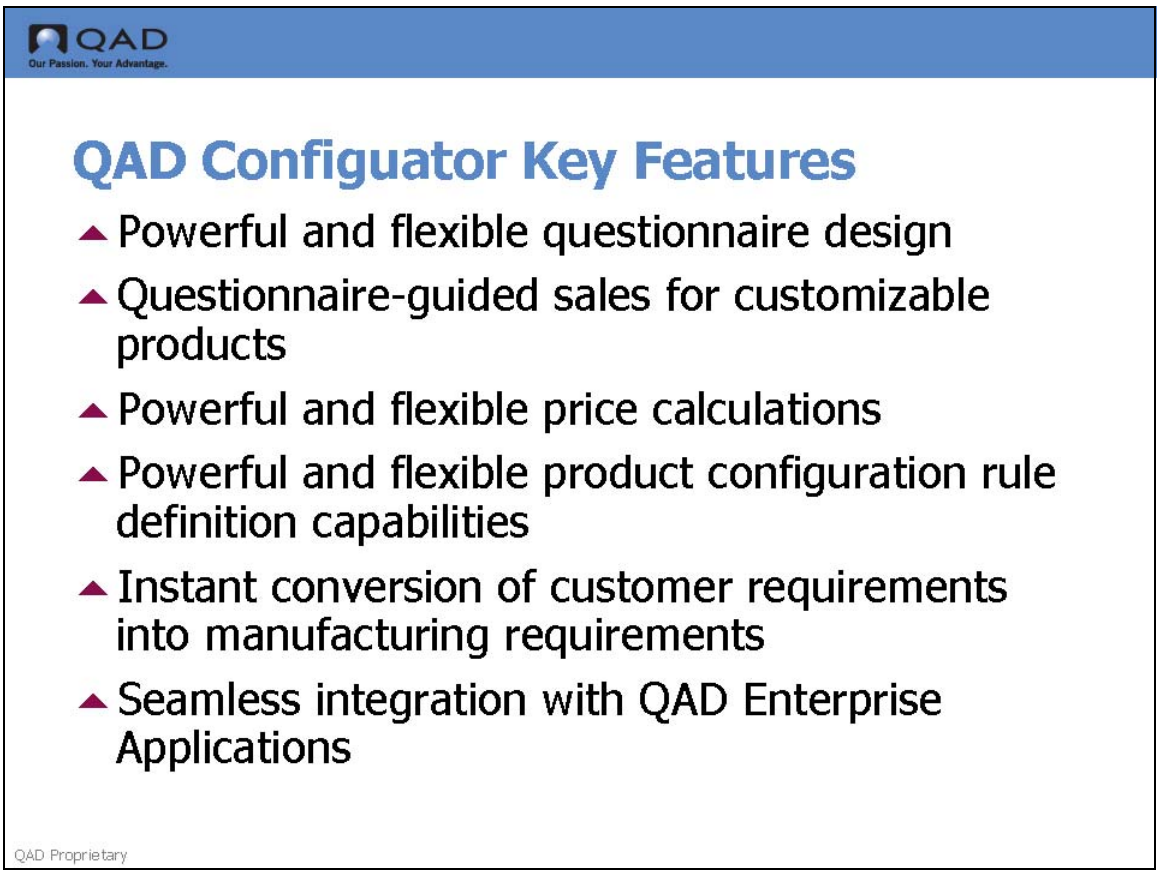
The relationship of the Variety/Volume matrix is between the volume and variety of products produced and the particular manufacturing strategy chosen to accomplish the production.

As you can see in the matrix, if you adopt the make-to-order and assemble-to-order strategies, you may have a fairly large number of product varieties as well as a fairly large number of volumes. Three key questions are to be answered in this area for the strategies to be successful:

- How can you effectively create and maintain all possible product configurations?
- How can you efficiently collect customers' specific requirements?
- How can you swiftly translate customers' requirements into manufacturing requirements?

QAD Configurator can help you answer these questions.

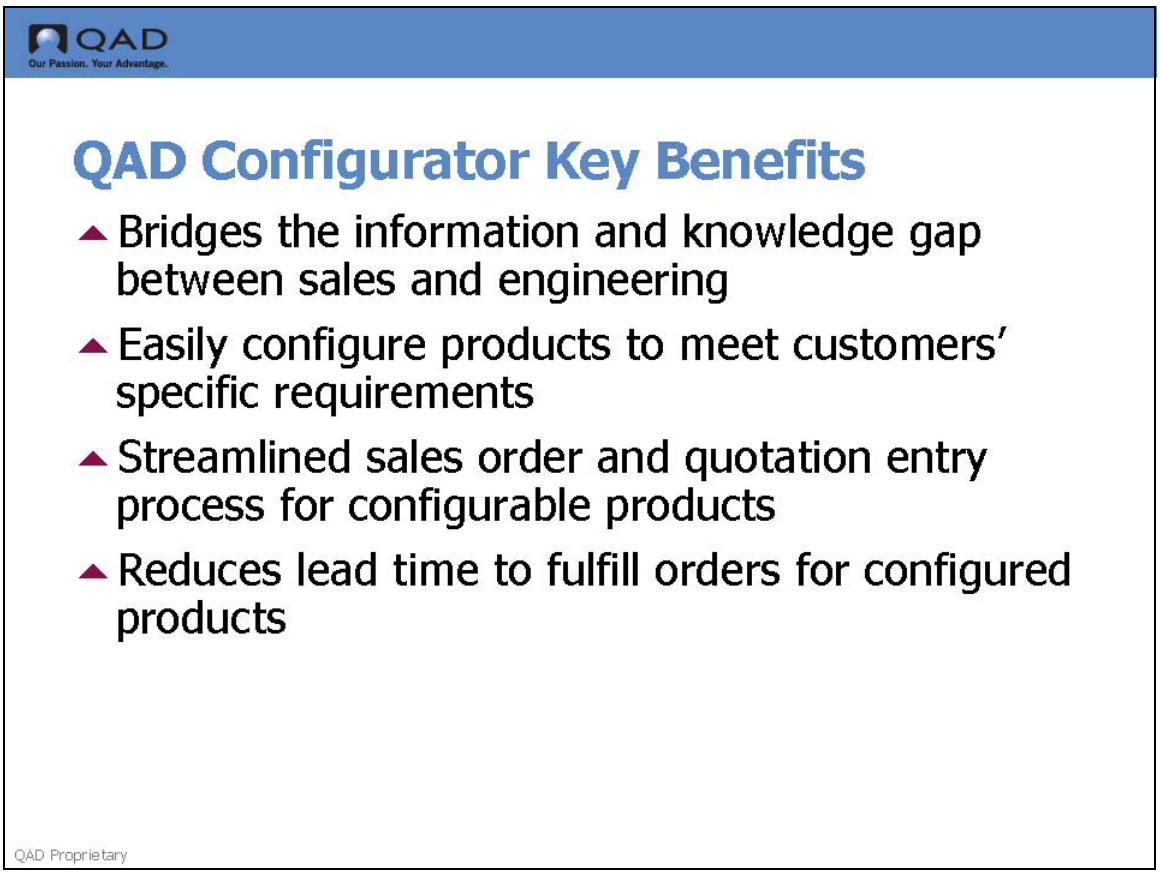
QAD Configurator Key Features



QAD Configurator is a product configuration and guided selling tool that allows make-to-order and assemble-to-order companies to quickly and efficiently create sales orders based on specific customer requirements and ultimately manufacture and fulfill complex, customized products and services. It is an add-on module to QAD Enterprise Applications and provides flexible and powerful product configuration and computer-aided order entry capabilities.

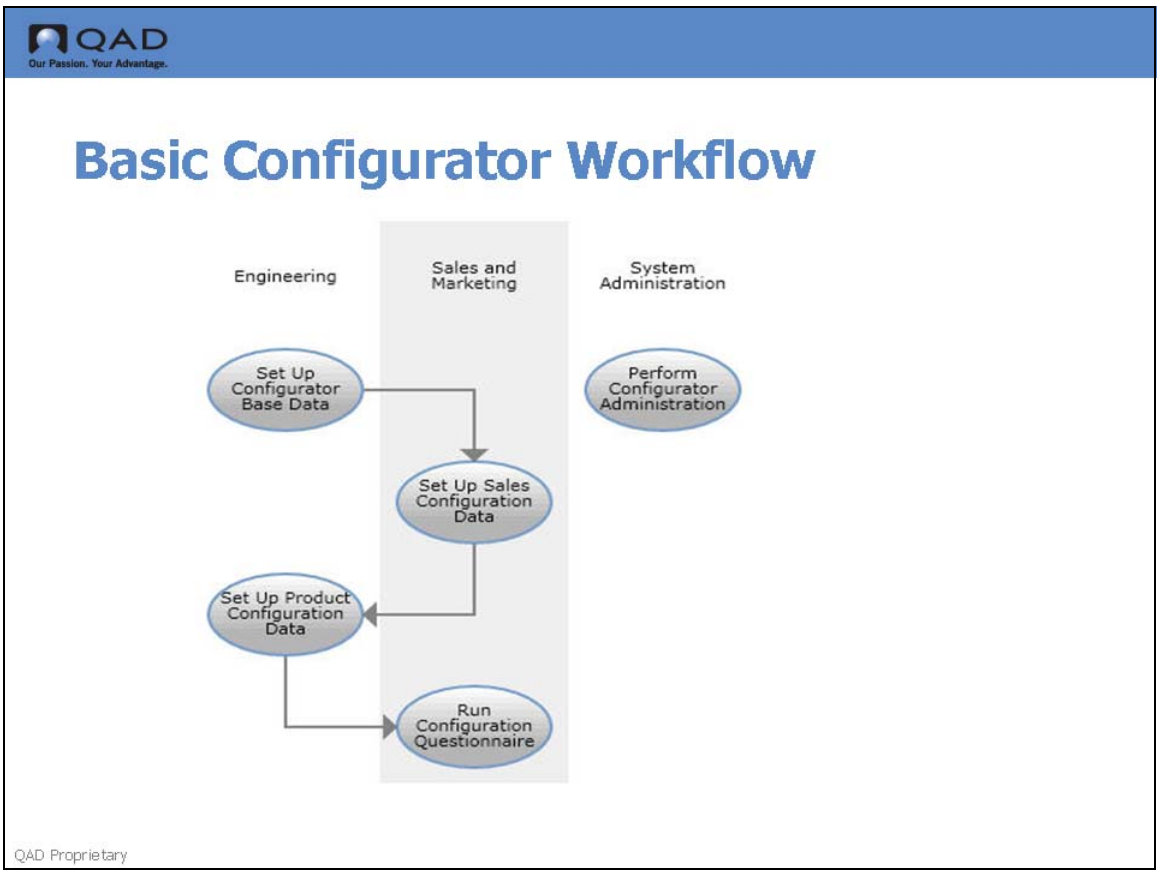
QAD Configurator is specifically designed for manufacturing companies who produce products that are highly configurable or are routinely customized to meet the unique needs of their customers. By seamlessly integrating into QAD's order entry process, QAD Configurator ensures complete and valid product configuration during order entry and instantaneously translates customers' unique product requests into quotations, sales orders, bills of material, and routings.

QAD Configurator Key Benefits



QAD Configurator effectively bridges the information and knowledge gap between product engineering and sales by allowing sales personnel to access the most current product data maintained by engineering personnel and enter orders with complex configurations based on customers' specific requirements without having to know the product details and possess a strong technical background.

Basic Configurator Workflow



- System Setup

  Prior to using QAD Configurator, perform system setup including setting up data in QAD ERP and configuring Configurator settings.

- Sales Configuration

  Sales personnel maintain variables and features that define configurable product characteristics, designate how to present features as questions in the guided sales questionnaire, as well as set up sales configuration rules to ensure data collected from the questionnaire is valid.

- Product Configuration

  Engineering personnel define product configuration rules that translate feature data collected from questionnaires into product structures and routings of configured products.

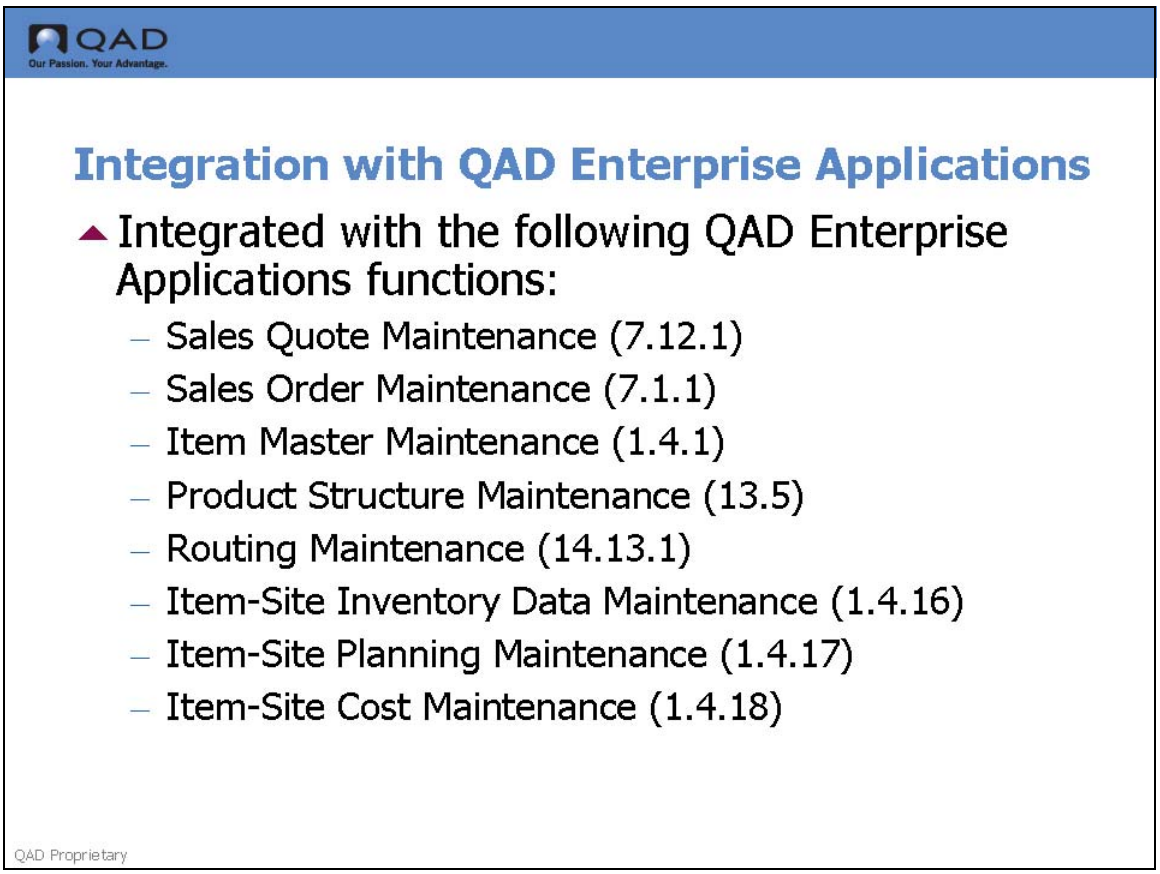
- Guided Sales

  Sales personnel run the questionnaire during order or quotation entry to configure products to meet specific customer needs. Data collected in this guided sales process identify new product configurations and translate new customer requirements into new product structures and routings.

- Administration

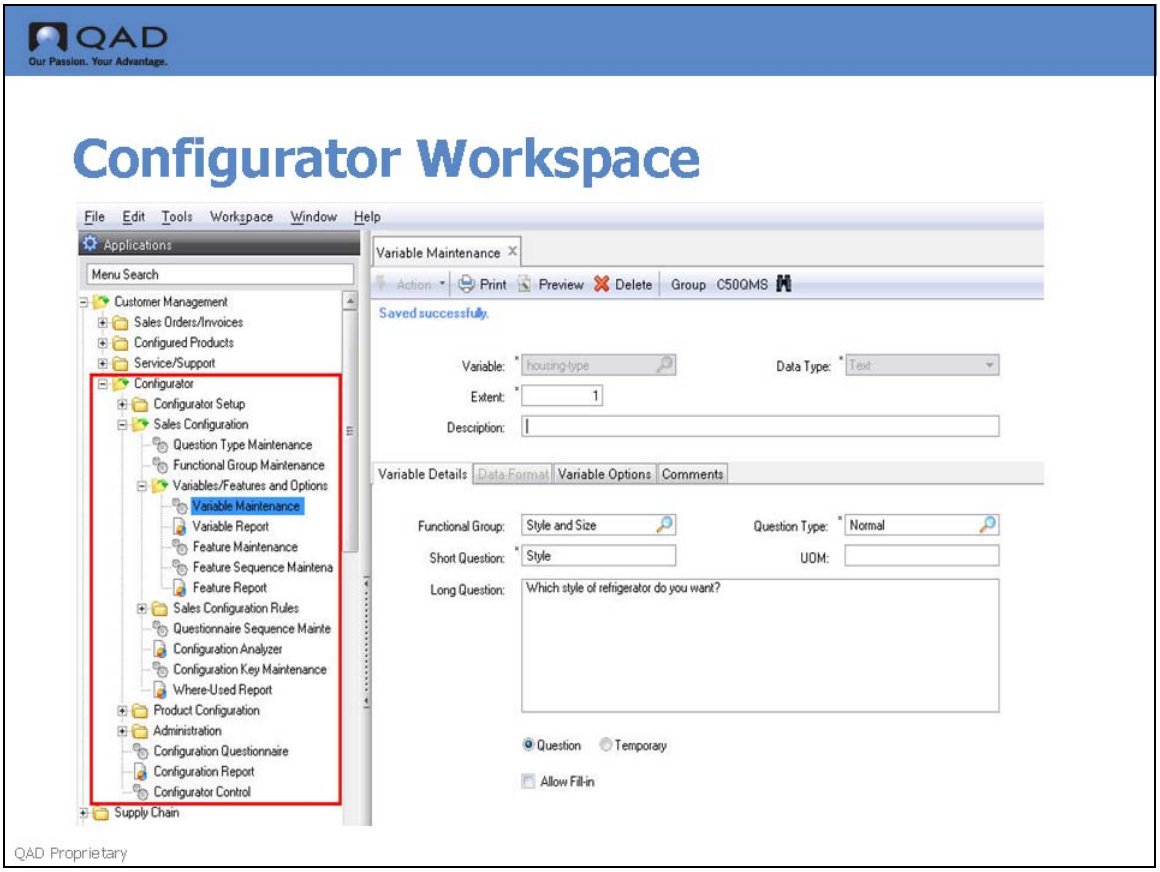
  Use a range of administrative functions to maintain the system for optimal performance.

Integration with QAD ERP



- You can access QAD Configurator functions by using either the Menu Search field or the menu tree in the Applications pane in the QAD .NET user interface.
- After you install QAD Configurator, QAD Configurator functions are grouped under Customer Management|Configurator by default in QAD Enterprise Applications 2010 EE. For earlier versions of QAD ERP, QAD Configurator functions can be found under Distribution|Configurator.
- The Questionnaire module is automatically launched when you select a configurable item in the order line in Sales Order Maintenance (7.1.1) or Sales Quote Maintenance (7.12.1) in the QAD ERP .NET UI environment.

QAD Configurator Workspace



Integrated with QAD ERP, QAD Configurator is embedded in the application area of the QAD .NET user interface and therefore is consistent with the rest of the QAD ERP applications in terms of look and feel and navigation.

Performance Check

1 QAD Configurator is NOT suitable for companies manufacturing which of the following products?

A. Cars

B. Hamburgers

C. Personal computers

D. DIY furniture

2 QAD Configurator lets you do all of the following EXCEPT:

A. Design questionnaires

B. Collect customers' requirements

C. Generate generic routings

D. Forecast customers' demands

3 Which user interface does QAD Configurator 5.0 support?

A. CHUI

B. Windows GUI

C. Web

D. QAD .NET UI

4 QAD Configurator provides the following benefits EXCEPT:

A. Sales and engineering data consolidation

B. Easy product configuration

C. Streamlined order processing for configurable products

D. Reduced delivery lead time

5 Engineering personnel define rules that translate feature data collected from questionnaires into product structures and routings of configured products in:

A. System setup

B. Sales configuration

C. Product configuration

D. Guided sales questionnaire

Chapter 2

System Setup

Scenario

The Industrial Refrigerator used in this training is a configurable item that is made to order out of standardized components.

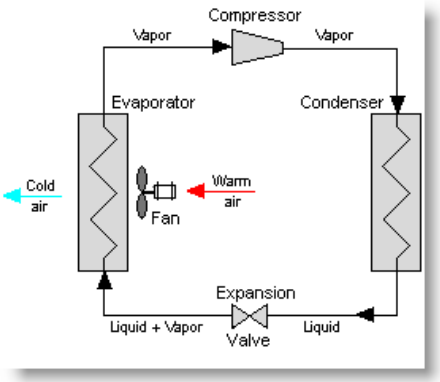
With QAD Configurator. the generic product structure of an item contains all component items that could possibly be needed to build any variant (configuration) of it. A variant product structure will always consist of a subset of the components of the generic product structure.

The following diagram shows the generic product structure of the Industrial Refrigerator. In this product structure C-S320 and C-S410 are also configurable items.

Parent Item/BOM Code: C-F200 Refrigerator, Industrial
As Of: 01/11/10 Levels: Rev:
PCO Number: ID: Domain: Output:

Level	Component Item	Description	Quantity Per	UM
Parent	C-F200	Refrigerator, Industrial		EA
1	C-S145	Icemaker, Industrial	1.0	EA
1	C-S210	Power Cord, UK	1.0	EA
1	C-S211	Power Cord, Australia	1.0	EA
1	C-S212	Power Cord, USA	1.0	EA
1	C-S213	Power Cord, Universal	1.0	EA
1	C-S310	Battery, Alkeline	4.0	EA
1	C-S311	Battery, Nickel-Cadmium	4.0	EA
1	C-S312	Battery, Lithium-Sulfur	4.0	EA
1	C-S320	Industrial Housing	1.0	EA
.2	C-P361	Paint, White	0.7	LT
.2	C-P362	Paint, Black	0.75	LT
.2	C-P363	Paint, Other	0.75	LT
.2	C-S330	Sheet Steel, 80*120 cm	1.0	EA
.2	C-S332	Sheet Steel, 160*200 cm	1.0	EA
.2	C-S333	Sheet Stainless Steel 80*120 cm	1.0	EA
.2	C-S335	Sheet Stainless Steel 160*200 cm	1.0	EA
.2	C-S510	Evaporator 20*40 cm	1.0	EA
.2	C-S520	Condenser 20*40 cm	1.0	EA
.2	C-S610	Fan, 1200 Watt	1.0	EA
.2	C-S611	Fan, 1500 Watt	1.0	EA
.2	C-S710	Compressor, 100 lpm	1.0	EA
.2	C-S711	Compressor, 150 lpm	1.0	EA
.2	C-S712	Compressor, 250 lpm	1.0	EA
1	C-S410	Control Unit	1.0	EA
.2	C-S411	Control Unit Motherboard	1.0	EA
.2	C-S430	Power Converter, Standard	1.0	EA
.2	C-S431	Power Converter, Smart	1.0	EA
1	C-S530	Expansion Valve	1.0	EA
1	C-S820	Transportation Box	1.0	EA
1	C-S910	Refrigerant, Standard	1.0	EA
1	C-S911	Refrigerant, Medic-Grade	1.0	EA

In this scenario both the product structure for a variant and the corresponding routing will be configured using QAD Configurator. Both will be configured across multiple levels of the product structure.



QAD Enterprise Applications Setup

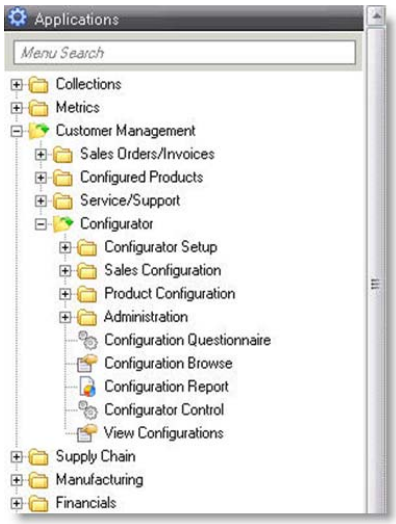
The Configurator training is based on the following QAD Enterprise Applications data:

- Items
- Product Structures
- Work Center and Routings

This data is already in the system and is part of the QMS set of data. Please refer to the appendix and review this data.

QAD Configurator Setup

Start QAD Configurator from the QAD Enterprise Applications menu by choosing menu Configurator. You can also run the Configurator using the process maps.



Configurator Control

Configurator Control is used to define the QAD Configurator system settings such as the directories in which created sources are written by QAD Configurator.

Exercise 1: Configurator Control

Run Configurator Control to verify the default settings for using QAD Configurator or to enter new ones. Make sure the entries are consistent with those in the following table.

Field	Entry
Appserver Questionnaire Directory	Use current setting (for instance q:\qst)
Appserver Variant Directory	Use current setting (for instance: q:\var)
SQ Maintenance	Select Product Structure
SO Maintenance	Select Product Structure
Pegging for Re-Analyze	Selected

Master Group Maintenance

Whenever you have a large quantity of manufacturing data in your QAD ERP database, you can simplify the process of using QAD Configurator by setting up additional groups to subdivide and categorize the products and product families that your company produces.

When you create a new group, you can also set up various defaults and settings that control the way QAD Configurator operates within this group only. For example, you can set up the default number of digits and decimals that are used for numeric variables and features created in the group; you can select a default rounding method; you can specify whether single-level or multi-level product structures are used; and you can specify whether you require QAD Configurator to generate variant routings for products configured in this group.

When you have defined different groups, you can categorize information in QAD Configurator by storing it in the correct group. This enables you to store and maintain various models (such as configurable items, variables, features, sales or product configuration rules) separately.

Exercise 2: Master Group Maintenance

Run Master Group Maintenance to verify the default settings for using QAD Configurator or to enter them. Make sure your entries are consistent with the data in the following table.

Field	**Entry**
Master Group	C50QMS
Description	Configurator 5 QMS Scenario
General Settings	
Allow Multi-Level Product Structure	Selected
Create Variant Routings	Selected
Use Standard Options	Not selected
UOM	Blank
Default Numeric Format Settings	
Digits	8
Decimals	2
Allow Negative Values	Not selected
Rounding Method	Standard

Configurable Item Selection	
P/M Type	Select all check boxes
Phantom Item	Selected
Effective Only	Selected

Note Many QAD Configurator menus contain information that belongs to a certain group. If this is the case the current group will be shown in the toolbar at the top of the screen.

Configurable Item Maintenance

In the scenario at the beginning of the System Setup section we reviewed the product structure of the Industrial Refrigerator. If you want QAD Configurator to configure variants of this item, you must tell QAD Configurator where it can find the list of components to choose from. You do this by defining the Industrial Refrigerator as a configurable item in QAD Configurator. But that is not enough if you are dealing with a multi-level product structure. In this case you must define every lower-level configurable item in the product structure as a configurable item in QAD Configurator as well, because all of these items have a number of (mutually exclusive) components themselves. If it recognizes an item as a configurable item, QAD Configurator will reference the product structure entered in the Manufacturing module whenever it has to.

The item number is copied to the QAD Configurator database when you define an item as a configurable item using Configurable Item Maintenance.

Note All item data, such as product structures and routings, are only maintained in the QAD Enterprise Applications database. There is no duplication of data.

Exercise 3: Configurable Item Maintenance

Once an item is a configurable item, QAD Configurator will automatically be started when this item is entered on a sales quotation or sales order line.

Run Configurable Item Maintenance and click the New button to display the item browse. Now select the items listed in the table below and set the following attributes (make sure that group C50QMS is selected). Accept the default value of all the other fields.

Configurable Item	Description	SO Type	Configuration Selection / Retention	Variant Item Cost Roll-Up	Cost Set
C-F200	Refrigerator, Industrial	BOM	Select Last Matching Auto Select: Off No Duplicates	yes	Standard
C-S320	Industrial Housing	BOM	Select Last Matching Auto Select: Off No Duplicates	yes	Standard
C-S410	Control Unit	BOM	Select Last Matching Auto Select: Off No Duplicates	yes	Standard

Note Many QAD Configurator menus contain information that belongs to a certain configurable item. If this is the case, the current configurable item will be shown in the title bar of the window.

Chapter 3

Sales Configuration

In this chapter we define the questionnaire. This is done using the programs in the Sales Configuration menu. Earlier in this course we reviewed the generic product structure and routing of the Industrial Refrigerator. We will now add the variables and features that define the characteristics of this configurable product. We will also specify how to present features as questions in the guided sales process (questionnaire), as well as set up sales configuration rules to ensure data collected from the questionnaire is valid.

Question Type Maintenance

A customer who wants to buy an industrial refrigerator must specify which variant he prefers. To help him select his preferred configuration you will offer him a list of questions and potential answers. When the customer has completed this questionnaire, QAD Configurator can create a product structure and corresponding routing for the chosen variant.

To help organize a configuration model, questions in the QAD Configurator Questionnaire can be categorized into Question Types.

Example Suppose that defining a variant requires that an engineer reviews the answers given by the customer and answers some additional questions himself. In that case the questions to be answered by the engineer should not be presented to the customer in the questionnaire. Now if you do not want a question to be shown in the questionnaire you can tell QAD Configurator by defining the question as a background question. So in the situation described, you would define the questions to be answered by the engineer as background questions. Furthermore, to make the purpose of the set of background questions clear, you would define a question type Special and attach these background questions to it. The questions of type Special would then be the ones to be answered by the engineer.

Exercise 4: Question Type Maintenance

Use Question Type Maintenance to add the following Question Types (you can enter Description according to your own wishes):

Question Type	Description	Level
Normal	Normal Questions	Foreground
Special	Special Questions	Background

Functional Group Maintenance

Functional groups are used to categorize variants and features by their functions. For example, you can group features of a computer product into hardware, software, and accessories. Similarly, the features of the Industrial Refrigerator can be grouped into technical specifications, style and size, and accessories.

Exercise 5: Functional Group Maintenance

Run Functional Group Maintenance and add the functional groups listed below.

Functional Group	Description
Technical Specs	Technical Specifications
Style and Size	Refrigerator Style and Size
Accessories	Accessories

Variable and Variable Options Definition

Variables are general characteristics of items. Because many items can share the same characteristics, it would not be a good idea to maintain the characteristics of every item separately. That is why we will first define the characteristics (variables) we need and link them to the items later on. Depending on the data type of a variable. we can define a set of possible values for it.

Exercise 6: Variable Maintenance

Run Variable Maintenance. This is where we define the variables and options that will be used for the configurable items.

Create the variables that are listed in the following table. Keep the default value 1 for Extent. Add Long Question texts to the variables if you wish. The options are specified in the Variable Options tab, the numeric parameters are specified in the Data Format tab.

When you enter variable options, use the arrow buttons on the toolbar to define the order in which you want the options to appear in the questionnaire. By default, the first option in the list will be the default answer for the associated question. You need not stick to the order that is shown in the table.

The entry N.A. stands for not applicable. Suppose that the answer to one question makes another question superfluous. You can then inform the customer and the salesperson that this question need not be answered by assigning the default answer not applicable to it.

Variable	Data Type	Functional Group	Question Type	Short Question	UM	Question / Temporary	Variable Options or Data Format
backup	Logical	Accessories	Normal	Backup		Question	
backup-type	Text	Accessories	Normal	Backup Type	EA	Question	Alkaline Battery NiCd Battery LiS Battery N.A.
coolperform	Text	Technical Specs	Normal	Cooling Performance		Question	Standard High Performance
country	Text	Technical Specs	Normal	Country to be installed in		Question	See note below
housing-area	Numeric	Style and Size	Normal	Housing Area		Temporary	Digits: 8 Decimals: 0
housing-back	Numeric	Style and Size	Normal	Housing Back		Temporary	Digits: 8 Decimals: 0
housing-color	Text	Style and Size	Normal	Housing Color		Question	White Black Other

Variable	Data Type	Functional Group	Question Type	Short Question	UM	Question / Temporary	Variable Options or Data Format
housing-height	Numeric	Style and Size	Normal	Housing Height	CM	Question	Digits: 4 Decimals: 0 Minimum: 80 Maximum: 200 Multiplier: 40 Default: 120
housing-length	Numeric	Style and Size	Normal	Housing Length	CM	Question	Digits: 4 Decimals: 0 Minimum: 60 Maximum: 100 Multiplier: 20 Default: 60
housing-type	Text	Style and Size	Normal	Style		Question	Single Door Front Double Doors Front Toploader
housing-width	Numeric	Style and Size	Normal	Housing Width	CM	Question	Digits: 4 Decimals: 0 Minimum: 80 Maximum: 160 Multiplier: 20 Default: 80
icemaker	Logical	Accessories	Normal	Icemaker		Question	
power-converter	Text	Technical Specs	Special	Power Converter		Question	Standard Smart
sheets-large	Numeric	Style and Size	Normal	Qty Sheets - Large		Temporary	Digits: 8 Decimals: 0
sheets-small	Numeric	Style and Size	Normal	Qty Sheets - Small		Temporary	Digits: 8 Decimals: 0
stainless-steel	Logical	Style and Size	Normal	Stainless Steel		Question	
temprange	Text	Technical Specs	Normal	Temperature Range		Question	Cooler Freezer Super Freezer
volume	Numeric	Style and Size	Normal	Volume	LT	Question	Digits: 8 Decimals: 0

Note A single variable may have more than one meaning. By defining a number of extents for such a variable you can distinguish between its various meanings. For instance, if both the housing and the icemaker have a color, you can define a variable color and give it extent 2. Then you can use color[1] as if it were the color of the housing and color[2] as if it were the color of the icemaker.

Note The industrial refrigerator can be sold in many countries. To avoid having to enter each country as a variable option we will use the QAD Configurator browse feature. When Allow Fill-In is selected, you can associate the variable with an existing browse so that the question respondent can select a value from the browse instead of manually typing in an answer in the questionnaire. If you assign a browse code to the variable, the answer to the corresponding question must be a value from the browse.

Assign the following values to variable country.

Variable	Allow Fill-In	Browse Code
country	Yes	ad015

Feature and Feature Options Definition

We can now link the defined variables to the configurable items to which they apply. Once we have done this, the variables become features of those items. The variable itself remains available, so that we can use it again at some later time. The feature inherits the detail data we specified for the variable in Variable Maintenance. However, this data can be overruled on the item level in Feature Maintenance.

Apart from the detail data, a feature may also inherit options from the corresponding variable, if not of type numeric. Whether or not this happens depends on whether Standard Options is selected in the Feature Options tab. Remember we also saw Use Standard Options in Master Group Maintenance. Now suppose that the Use Standard Options check box was selected in Master Group Maintenance. This means that the options of a feature will always be exactly those you defined for the corresponding variable. If the check box was not selected in Master Group Maintenance, then it is possible to delete options from the list of variable options and to add item-specific options. If the Use Standard Options check box was not selected in Master Group Maintenance, it is possible to select it in Feature Options tab, thus overruling the setting in Master Group Maintenance and making it impossible again to add or delete options in the Feature Options tab.

Exercise 7: Feature Maintenance

Run Feature Maintenance and select the configurable items listed in the toolbar. Add the features by using the button Copy from Variable.

Notice that when Standard Options is selected, you cannot use the buttons—Insert, Delete, and so on—on the toolbar in the Feature Options tab. When it is deselected these buttons are available.

Notice also that besides being able to remove feature options from the variable options list, you can also add options, and/or change the default answer by using the arrow buttons on the toolbar.

Make sure Standard Options is deselected for the feature housing-color and selected for all other features.

Configurable Item	Feature	Use Standard Options
C-F200 Refrigerator, Industrial	backup	Yes
	backup-type	Yes
	coolperform	Yes
	country	Yes
	icemaker	Yes
	temprange	Yes
C-S320 Industrial Housing	housing-area	N.A.
	housing-back	N.A.
	housing-color	No
	housing-height	N.A.
	housing-length	N.A.
	housing-type	Yes
	housing-width	N.A.
	sheets-large	N.A.
	sheets-small	N.A.
	stainless-steel	Yes
	volume	Yes
C-S410 Control Unit	power-converter	Yes

Feature Sequence Maintenance

Now we will look at how we can influence the order in which the questions are presented in the questionnaire. The default order is the alphanumeric order of the feature identifiers.

Note Rules may influence the order in which the questions are presented in the questionnaire. The system will automatically assign a sequence, based on the dependencies of questions that follow from the rules entered in the Sales Configuration Rules menu. (For instance: if A depends on B, then B must be answered before A.) You, as a user, can influence the sequence, as long as you do not choose an order that is in conflict with these dependencies. In the case of a conflict the system will overrule your sequence.

Exercise 8: Feature Sequence Maintenance

Run Feature Sequence Maintenance. Use the buttons on the toolbar to define the order in which you want the features to be displayed and save your changes.

You can also change the order of functional groups by dragging and dropping the functional group tab to your desired position.

Sales Configuration Rules

Sales configuration rules determine the dependencies between the options of variables/features. They may also influence the order in which the questions are presented in the questionnaire. Besides, rules determine which options become invalid as a result of answers to former questions and can even answer a question automatically if there is only one valid answer left.

In general rules consist of clauses. A clause is an expression. The so-called IF clause represents a condition. The THEN clause and the ELSE clause represent a conclusion.

Example In the rule if A = a then B = b else C = c, the IF clause is A = a, the THEN clause is B = b and the ELSE clause is C = c.

First of all an overview of the functions that you can use to define sales configuration rules:

- General Rule Maintenance
- Rule-Group Maintenance
- Item Rule Maintenance
- General Rule Table Maintenance
- Item Rule Table Maintenance

In General Rule Maintenance you can define rules irrespective of a configurable item. These are rules that may be true for more than one configurable item. They are defined independently of the items and linked to them at a later stage.

In Rule-Group Maintenance you can group general rules into a defined rule-group. A rule-group contains instance of rules concerning the same topic.

You can use Item Rule Maintenance to:

- Link general rules directly to an item, without grouping them first.
- Link a whole rule-group to an item.
- Define item-specific rules for an item.

Rule tables offer an easy way to enter a number of rules of a certain type that look very much alike. A general rule table contains rules that may be valid for more than one configurable item; an item-specific rule table contains rules that are only valid for the item for which the rule table was defined.

General Rule Maintenance

If a rule applies to more than one item, we do not have to enter it for every item separately. Instead, we can define it once and then link it to as many items as we want. To do this, we must enter the rule as a general rule in QAD Configurator.

A characteristic of a general rule is that any modification to it is visible wherever this general rule is used; for instance, in every rule-group it belongs to and for every item to which it is linked.

Exercise 9: General Rule Maintenance

Run General Rule Maintenance and create the following rule by following the instructions.

Rule ID	Rule Syntax
GR001	if backup = no then backup-type = n.a. else backup-type <> n.a.

1 Enter GR001 in the Rule ID field and press Enter.

2 In the Rule Editor pane, select Conditional rule type. If, Then, and Else statements display.

3 In the If statement, select backup, Value, =; then click the Browse button and select No from the Variable Options box.

4 In the Then statement, select backup-type, value, =; then click the Browse button and select n.a. from the Variable Options box.

5 In the Else statement, select backup-type, value, <>; then click the Browse button and select n.a. from the Variable Options box.

6 Click the Update button to display the rule you are composing in the Preview pane.

7 Click the Check Syntax button to check whether the rule syntax is correct. If the rule is valid, you can see the status Passed under the button; otherwise, a Rule Check Configuration window will pop up displaying detailed error messages.

8 Click Save to save the rule.

Rule Group Maintenance

To categorize rules we must first create one or more empty rule-groups. Once these have been defined we can link existing general rules to them.

When linking a general rule to a rule-group, you can decide to copy the rule to a rule-group-specific rule. In this case the general rule remains available, but a copy of the general rule is linked to the rule-group and made specific for that particular rule-group. That way a modification to the general rule will not change the specific rule.

Exercise 10: Rule Group Maintenance

Run Rule-Group Maintenance and create a rule-group General. Select the general rule GR001 and link it to the rule group. Save it, and the Summary pane will show the link you created.

Rule-Group ID	Description	Rule ID of General Rule Linked
RG001	General Rule Group	GR001

In the Rule Group Details tab you select the available rules in this group in order of linking them to the rule group. A Copy symbol in the toolbar of the tab allows you to create a rule-group specific copy of any of the displayed rules.

Item Rule Maintenance

In Item Rule Maintenance you can link general rules or rule groups (with general rules attached) to configurable items. You can also create new rules that just apply for the specific configurable item selected. New item-specific rules can be entered directly or copied from a general rule.

Exercise 11: Item Rule Maintenance: Link Rule-Group

Use Item Rule Maintenance to link the rule group RG001 to the industrial refrigerator by selecting it. Save it, and the Summary pane will show the link you created.

Rule-Group ID	Item to link this rule to
RG001	C-F200 (Industrial Refrigerator)

So far we have discussed how we can define general rules, how we can link general rules to items through rule groups and how we can link them to items directly. And we saw how we can define an item-specific rule by converting a general rule.

Item-specific rules can be entered directly—that is, without first entering a general rule and then modifying it. An item-specific rule that is entered directly only exists for that particular item and cannot be used elsewhere.

Exercise 12: Item Rule Maintenance: Create Item Rule

We now want to add the rules for the various levels of configurable items. Run Item Rule Maintenance to add the item-specific rules listed in the table below. Some of the rules for item C-S320 require the use of attributes.

Item	Rule ID	Item-Specific Rule
C-F200	IR001	if temprange = “Super Freezer” then coolperform = “Standard”
C-S320	IR002	if stainless-steel = Yes then housing-color = “N.A.” else housing-color <> “N.A.”
C-S320	IR003	if housing-type = “Single Door Front” then housing-width <= 100 else housing-width:<= 160
C-S320	IR004	if housing-type = “Double Doors Front” then housing-width >= 80 else housing-width:>= 60
C-S320	IR005	if housing-type = “Toploader” then housing-height:<= 120 else housing-height <= 200

Remarks and Exercises on Rule Modes

A rule generally consists of one preposition (IF), one conclusion (THEN), and possibly one alternative (ELSE). These clauses can contain one or more lines and can have different formats: basic, advanced, and free format.

A basic clause looks like this:

```
Variable = option.
```

The rules you entered previously are of this type (all three clauses are now in normal mode), for instance:

```
If stainless-steel = Yes then housing-color = “N.A.” else housing-color <> “N.A.”
```

An advanced clause is used to enter slightly more complicated expressions. It looks like this:

```
Variable = expression.
```

Example The THEN clause here is in advanced mode.

```
If housing-type = Single Door Front then housing-length = 0.5 * housing-width + 0.1 *
housing-height.
```

A free format clause can be used to create really complex rules. A clause of this type contains a Boolean expression which is true or false. This rule mode is only available for if-clauses. A rule of the free format type cannot be converted back to another rule format. That is why QAD Configurator will always prompt you to confirm your choice if you select the free format rule mode.

Here is an example:

```
If 0.1 * (housing-width * housing-length) > 0.5 * (housing-width + housing-height) then
```

```
backup = yes.
```

We will now practice with the different rule modes that are available.

Exercise 13: Item Rule Maintenance: Advanced Mode

When only a Then clause is defined, an assignment rule is created. An assignment rule is executed each time a question is answered in the questionnaire.

We will now run Item Rule Maintenance and enter rules IR006, IR007, and IR008 as defined in the table below. In the Rule Detail Edit frame select Assignment from the list box. Select the feature to be used from the Assign list box (according to the table), then click on Values/Options and select the Advanced rule format. You will now have an advanced window in which you can type the remaining part of your then-statement. You can also use the Rule Assistant to enter it.

Item	Rule ID	Item-Specific Rule
C-S320	IR006	housing-back = housing-width * housing-height
C-S320	IR007	volume = housing-height * housing-width * housing-length * 0.00075
C-S320	IR008	housing-area = ((housing-length * housing-width) + (housing-length * housing-height) + (housing-height * housing-width)) * 2

Notice that this clause is now saved as an assignment rule because it only contains a THEN-clause.

Note In rule IR007 we are converting from cubic centimeters to liters and reducing the volume by 25% to take into consideration the insulation inside the refrigerator.

Exercise 14: General Rule Maintenance: Free Format Mode

Run General Rule Maintenance. Enter the rule that is listed in the table below by selecting Switch to Free Format in the If clause:

Rule ID	If Clause	Then Clause	ELSE Clause
GR002	(country = “AUSTRALIA”) or (country = “BELGIUM”) or (country = “FRANCE”) or (country = “GERMANY”) or (country = “UNITED STATES”) or (country = “UNITED KINGDOM”)	power-converter = Standard	power-converter = Smart

Update the rule and verify your rule using the Check Syntax button.

Now run Item Rule Maintenance and link rule GR002 to item C-S410.

General Rule ID	Item to link this rule to
GR002	C-S410 (Control Unit)

Rule Tables

With a rule table you can define rules in a different, sometimes easier way. This can be especially useful in situations where the rules are quite simple, but where there are many different combinations of the options. Just by selecting some variables and filling in a rule table you can let QAD Configurator automatically create a number of IF...THEN... rules for you.

Note Rules containing ELSE clauses cannot be entered by way of a rule table.

Rule tables can be either general or item-specific. Like in the case of separate rules you can define a general rule table and link it to one or more items. If you decide to change such a general rule table, then it is automatically changed for every item to which it is connected. You can also define an item-specific rule table; it can only be maintained for the particular item for which it was created.

QAD Configurator guides you through defining a rule table, according to the following steps:

1. Select Condition
2. Set Value for Condition
3. Select Conclusion
4. Set Value for Conclusion

When defining an item-specific rule table you use features instead of variables.

The maximum number of variables in a single rule table is 20. You can have as many condition variables (if) and as many result variables (then) as you want, provided the total does not exceed 20 and provided you have at least one condition and one result variable. A variable is characterized by the combination of its ID, its extent, and its attribute. The variables you choose are shown above the columns of the rule table. The type of clause they are in is indicated as well. Each row in the table represents a rule.

Example The rule:

```
if housing-height <= 120 and housing-width >80 and housing-length <= 80
then sheets-small = 2 and sheets-large = 4
```

will be shown as follows:

IF housing-height: Value	**IF housing-width: Value**	**IF housing-length: Value**	**THEN sheets-small: Value**	**THEN sheets-large: Value**
:120	[:80]	:80	2	4

Special syntax-rules have been devised for the contents of the cells of the rule tables.

The following entries are possible:

Entry	**Meaning**
value1	value1
value1|value2|value3	value1 or value2 or value3
value1:value2	>= value1 and <= value2
:value1	<= value1
value1:	>= value1
[value1]	not value1
[value1|value2|value3]	not value1 and not value2 and not value3
[value1:value2]	< value1 or > value2
[:value1]	> value1
[value1:]	< value1
[value1]:value2	> value1 and <= value2

Entry	Meaning
[value1]:[value2]	> value1 and < value2
value1:[value2]	>= value1 and < value2
:[value1]	< value1
[value1]:	> value1
[[value1]:value2]	<= value1 or > value2
[[value1]:[value2]]	<= value1 or >= value2
[value1:[value2]]	< value1 or >= value2
[:[value1]]	>= value1
[[value1]:]	<= value1

Entering a list of values and/or using exclusions for a result variable is only possible if all of the following conditions are met:

- The result variable is of the type Text, Numeric List, or Date
- The attribute of the result variable is value.
- In other cases lists and exclusions are generally meaningless and therefore not allowed.

You can move through the cells of a table by using Tab, Shift + Tab, Page Up, Page Down, Up Arrow and Down Arrow on the keyboard.

Note For rule tables there is no equivalent to the concept of rule groups.

Rules in a table can only be built from the variables that appear in the table. However, a rule in a table need not use every variable that is available in the table. This means that a column belonging to a variable can have empty cells for one or more rules (rows) in the table.

General Rule Table Maintenance

Using General Rule Table Maintenance you can define general rule tables. They can be linked to one or more items later on.

Exercise 15: General Rule Table Maintenance — Manual entry

Run General Rule Table Maintenance. Enter the table ID and a description. Now go to Step 1 and select the variables as follows (you can select several condition variables at the same time).

Rule Table	Condition Variables
GRT001	housing-height (value) housing-length (value) housing-width (value)

Press Next twice to skip Step 2 and go to Step 3. Select the result variables as follows (again, you can select several condition variables at the same time).

Rule Table	Result Variables
GRT001	sheets-small (value) sheets-large (value)

Press Finish (the system will tell you that no records have been created automatically) and go to the Rule Table tab.

Now enter these rules in the table:

Row	IF housing-height: Value	IF housing-width: Value	IF housing-length: Value	THEN sheets-small: Value	THEN sheets-large: Value
1	[:120]	[:80]	[:80]	0	6
2	[:120]	[:80]	:80	0	6
3	[:120]	:80	[:80]	0	6
4	[:120]	:80	:80	2	4
5	:120	[:80]	[:80]	0	6
6	:120	[:80]	:80	2	4
7	:120	:80	[:80]	2	4
8	:120	:80	:80	6	0

(Row 1 says: If housing-height > 120 and housing-width> 80 and housing-length > 80, then sheets-small =0 and sheets-large = 6.)

Have a look at the formula by choosing the Preview button on the toolbar. It shows the contents of the selected row, in the form of a complex rule.

Some special keys for navigating through the Table and for doing some simple actions are listed in the following table.

Keyboard Keys	Meaning
Arrow key up	Go one cell up
Arrow key down	Go one cell down
Page Up	Go 12 cells up (if available)
Page Down	Go 12 cells down (if available)
Home	Go to the first row in the rule table
End	Go to the last row in the rule table
Tab	Go one column to the right
Shift+Tab	Go one column to the left
Ctrl+G	Go to the row with the given row number
Ctrl+F	Start the Search and Replace function

Exercise 16: General Rule Table Maintenance: Auto-Generation

General Rule Table Maintenance also enables you to add rows (rules) to a table or to delete rows from a table in an easy way. It is especially useful when the rules you want to add or delete are reflecting most combinations of input (If) and output (Then) criteria.

We will use this capability to enter the following rules in the table: GRT002:

Row	IF country: Value	IF temprange: Value	IF coolperform: Value	THEN power-converter: Value
1	AUSTRALIA	Freezer	Standard	Standard
2	AUSTRALIA	Cooler	High Performance	Smart

Row	IF country: Value	IF temprange: Value	IF coolperform: Value	THEN power-converter: Value
3	UNITED KINGDOM	Freezer	Standard	Standard
4	UNITED KINGDOM	Cooler	High Performance	Smart
5	UNITED STATES	Freezer	Standard	Standard
6	UNITED STATES	Cooler	High Performance	Smart

Run General Rule Table Maintenance. Enter the table ID (GRT002) and a description. Now go to Step 1 and select the variables as follows (you can select several condition variables at the same time).

Rule Table	Condition Variables
GRT002	country (value) temprange (value) coolperform (value)

Press Next to go to Step 2 and select the following values:

- country is AUSTRALIA, UNITED KINGDOM, or UNITED STATES
- temprange is either Freezer or Cooler
- coolperform is either Standard or High Performance

Note The options for variable country are provided by a browse. Click the Add Value button to manually add the required countries.

Press Next to go to Step 3. Select the result variables as follows:

Rule Table	Result Variables
GRT002	power-converter (value)

Press Next to go to Step 4 and select the following values:

Select power-converter is Standard.

Note Because power-converter is a result variable and because you are adding rows, you can only enter one option for power-converter.

Press Finish and the system will then generate all possible combinations of the options you entered and add a rule (row) to the table for every combination it created. It will report the number of rows it has added to the table. Click OK to close this message and move to the Rule Table tab. The table should contain 12 rows.

Now you can manually edit the rules to arrive at the 6 rules specified in the table above. Delete the rules that have been created that you do not need. You will also have to manually change the cells in which power-converter does not have the correct value.

Note When you delete a row, the numbers of the remaining ones will be updated immediately. Therefore, it is better to delete the rows in descending order. To delete a rule (row), position the cursor in the cell containing the row number, click the mouse to select the row, then press the Delete button on the toolbar.

Any rules added automatically to a rule table can be modified manually at any time.

Experiment a little with the different formats of the entries (see the list of possible formats that was given earlier). To enter something in a cell you can type it directly in the cell, or select it from the option list you can switch on using the Options icon on the toolbar. You can enter the straight brackets by hand or click the Exclusion check box in the option list. You also can create lists by highlighting more than one option in the option list. Other special symbols need to be typed by hand.

We will not link this general rule table to any item.

Item Rule Table Maintenance

Apart from the general rule tables (which are characterized by the fact that you only need to enter/modify them once), you can also create item-specific rule tables, which can only be maintained for the item for which they were created. An item-specific rule table is either a modified general rule table or a completely new rule table that is entered only for a particular item.

The Item Rule Table Maintenance window looks very much like that of Item Rule Maintenance. The available general rule tables are shown in a list and you can link them to the current item by selecting them and clicking the check box. To copy a general rule table, you must highlight it, and select the Copy button on the toolbar. This will create a copy that will then be shown in the Specific section in the Summary pane.

You can also create an item-specific rule table directly. To do so, you enter the new table in the same way as when you used General Rule Table Maintenance.

Exercise 17: Item Rule Table Maintenance

Run Item Rule Table Maintenance and link the general rule table you created (GRT001) to item C-F200:

Rule Table	Item to link the table to
GRT001	C-F200

Configuration Key Maintenance

If you want the system to check whether or not a certain configuration has been defined before, you should use Configuration Key Maintenance first in order to specify which features uniquely identify a configuration. The system will then automatically match every new configuration with the existing ones based on the configuration key. If it finds one or more existing configurations that match the one you defined, QAD Configurator will suggest you use an existing one instead of creating a new one that is identical to it. This is done in order to make sure that the item database does not grow unnecessarily. QAD Configurator will create a configuration for every variant of a configurable item. That means that when you have a multi-level generic product structure, the system will create a configuration for every variant item. That is also why you have to define configuration keys for each configurable item in the generic product structure.

Now suppose that after some time you would like to change the configuration key you defined earlier. Since the configuration key is stored with each configuration, every configuration that was created while the old configuration key was still valid will need to be updated so that QAD

Configurator can check whether or not these existing configurations match the new configuration key. The system automatically updates the configuration key of existing configurations when a record is saved in Configuration Key Maintenance.

Exercise 18: Configuration Key Maintenance

Run Configuration Key Maintenance. Select the Industrial Refrigerator (item C-F200) and create a configuration key consisting of the features that are shown in the following table. Repeat this procedure for the lower level configurable items C-S320 and C-S410.

Item	Configuration Key
C-F200	coolperform country temprange
C-S320	housing-color housing-height housing-length housing-type housing-width
C-S410	power-converter

To specify configuration keys for a configurable item:

1. Specify a configurable item in the Configurable Item field.
2. To set a feature as a configuration key, select it in the Features list box and click Include to move it to the Configuration Keys list box. Click Include All to set all available features as configuration keys.

   To remove a configuration key, select it in the Configuration list box and click Exclude to move it to the Feature list box. Click Exclude All to remove all configuration keys.
3. Click Save.

Chapter 4

Product Configuration

In this chapter we will define how the system should translate the answers to the questions in the questionnaire into actual product structures and routings for the new configurations.

Within these exercises we start with the product configuration rules and then we analyze the model to ensure there are no inconsistencies in the rules we have entered.

Product Configuration Rules

This set of rules lets you define how the variant item, variant product structure, and variant routing are generated. Product configuration rules define the relationships between the answers to the questions in the questionnaire and the component items to be selected from the generic product structure, as well as the operations to be selected from the generic routing.

Variant Item Number Rule Maintenance

Use Variant Item Number Rule Maintenance to define how QAD Configurator assigns item numbers to new variant items. You do this by defining definition rules for each configurable item from which you intend to create variant items. It is compulsory to enter variant item number definitions for all configurable items in your model. If one or more definitions are missing, QAD Configurator cannot store the configuration correctly and will not continue generating the variant until you have entered all necessary definitions (Configuration Analyzer will terminate with an error).

Exercise 19: Variant Item Number Rule Maintenance

Run Variant Item Number Rule Maintenance and define the following variant item number definition for the configurable items C-F200, C-S320, and C-S410. Select Function equals Item.

Element	Input	Multiplier	From	To	Length
Current Configurable Item			1	6	6
Character	-				
Numeric Sequence	1	1			3

Variant Item Data Rule Maintenance

Use Variant Item Data Rule Maintenance to assign values to fields in the QAD Enterprise Applications Item Master table (pt_mstr) for the new variant items.

Exercise 20: Variant Item Data Rules Maintenance

Run Variant Item Data Rule Maintenance and enter the following information to tell the system that it must concatenate the first two characters of the variables temprange, coolperform, housing-type, stainless-steel and the variable volume and store the resulting value in the pt_desc2 field of configurable item C-F200.

Configurable Item	Field	Assignment Rule
C-F200	pt_desc2	SUBSTRING(temprange,1,2) + SUBSTRING(coolperform,1,2) + SUBSTRING(housing-type,1,2) + SUBSTRING(STRING(stainless-steel),1,2) + STRING(volume)

General Product Structure Rule Maintenance

Use General Product Structure Rule Maintenance to define general selection rules for selecting components into variant product structures that are not specific to configurable items. This means that a certain component will always be selected when the conditions in the selection rules are met, regardless of the configurable item for which you are configuring a variant.

Exercise 21: General Product Structure Rule Maintenance

Run General Product Structure Rule Maintenance and enter the selection rules that are listed in the table below. They state that component C-S910 should be selected whenever coolperform = Standard and that component C-S911 should be selected whenever coolperform = High Performance.

Component	Description	Selection Rule
C-S910	Refrigerant, Standard	coolperform = “Standard”
C-S911	Refrigerant, Medic-Grade	coolperform = “High Performance”

Note If required you can use the Rule Assistant to enter the selection rule.

Variant Product Structure Rule Maintenance

Use Variant Product Structure Rule Maintenance to define selection and assignment rules for component items in the generic product structure of a configurable item. If no selection rule has been defined for a component in the generic product structure, the component will always be selected into the variant product structure, unless its parent item is excluded from the variant product structure by its selection rules.

Exercise 22: Variant Product Structure Rule Maintenance

Run Variant Product Structure Rule Maintenance and select configurable item C-F200. Clicking on a certain component will show you the Selection Rule tab in the lower part of the screen, where you can enter the rule that specifies when that component is selected.

In the Assignment Rule tab in the lower part of the screen you can assign values to all fields in QAD Enterprise Applications Product Structure Master table (ps_mstr). You can view all field names by using the Insert/Update button and then clicking on the browse.

If you do not specify a selection rule, the component item will always be selected. If you do not specify any assignment rules, the system will copy the values from the generic product structure into the variant product structure.

We will now add the first selection rule step by step. This is what we will enter:

Configurable	Component	Description	Selection Rule
C-F200	C-S210	Power cord, UK	country = “UNITED KINGDOM”

This rule says: if the questionnaire is run for configurable item C-F200 then select component item C-S210 into the product structure of the variant item if the answer to the Country question equals “UNITED KINGDOM.” Otherwise do not select item C-S210 into the variant product structure.

Enter this rule by following these steps:

1. Run Variant Product Structure Rule Maintenance.
2. Enter the parent configurable item C-F200, and select Level 2(All).
3. Click on component item C-S210.
4. Position the cursor in the Selection Rule field in the Selection Rule tab.
5. Now type: country = “UNITED KINGDOM” or use the Rule Assistant to enter this expression.
6. Click the Check Syntax button.
7. If the rule is not correctly entered, solve the problems.
8. Click the Save button.

Now add the following selection rules as well. Try to understand why they are specified this way. Notice that configurable items C-S320 and C-S410 will always be selected, since they do not have a selection rule. Similarly, components C-S530 and C-S820 will always be selected.

Note Leave the Use General Product Structure Rule check box unchecked.

Do not enter anything for the other components. These items will always be selected.

Configurable Item	Component	Description	Selection Rule
C-F200	C-S145	Icemaker, Industrial	icemaker = Yes
	C-S210	Power Cord, UK	country = “UNITED KINGDOM”
	C-S211	Power Cord, Australia	country = “AUSTRALIA”
	C-S212	Power Cord, USA	country = “UNITED STATES”
	C-S213	Power Cord, Universal	country <> “UNITED KINGDOM” AND country <> “AUSTRALIA” AND country <> “UNITED STATES”
	C-S310	Battery, Alkaline	backup-type = “Alkaline Battery”
	C-S311	Battery, Nickel-Cadmium	backup-type = “NiCd Battery”
	C-S312	Battery, Lithium-Sulfur	backup-type = “LiS Battery”
	C-S320	Housing	
	C-S410	Control Unit	
	C-S530	Expansion Valve	
	C-S820	Transportation Box	
C-S320	C-P361	Paint, White	housing-color = “White”
	C-P362	Paint, Black	housing-color = “Black”
	C-P363	Paint, Other	housing-color <> “White” AND housing-color <> “Black” AND housing-color <> “N.A.”
	C-S330	Sheet Steel, 80*120 cm	stainless-steel = No AND sheets-small > 0
	C-S332	Sheet Steel, 160*200 cm	stainless-steel = No AND sheets-large > 0
	C-S333	Sheet Stainless Steel, 80*120 cm	stainless-steel = Yes AND sheets-small > 0

Configurable Item	Component	Description	Selection Rule
	C-S335	Sheet Stainless Steel, 160*200 cm	stainless-steel = Yes AND sheets-large > 0
	C-S610	Fan, 1200 Watt	housing-back < 15000
	C-S611		housing-back >= 15000
	C-S710	Compressor, 100 lpm	volume < 750
	C-S711	Compressor, 150 lpm	volume >= 750 AND volume <= 1500
	C-S712	Compressor, 250 lpm	volume > 1500
C-S410	C-S430	Power Converter, Standard	power-converter = “Standard”
	C-S431	Power Converter, Smart	power-converter <> “Standard”

Now go back to configurable item C-F200 and add the following selection rules.

Note For these components select Use General Product Structure Rule.

Configurable Item	Component	Description	Selection Rule
C-F200	C-S910	Refrigerant, Standard	coolperform = “Standard”
	C-S911	Refrigerant, Medic-Grade	coolperform = “High Performance”

Now go back to configurable item C-F200 and enter the following assignment rule for component item C-S320:

Configurable Item	Component	Field	Assignment Rule
C-F200	C-S320	ps_rmks	if backup = yes then “This product structure will contain a backup device” else “No backup device needed”

Now go back to configurable item C-S320 and enter the following assignment rules as specified in the table below:

Configurable Item	Component	Field	Assignment Rule
C-S320	C-P361	ps_qty_per	ps_qty_per * housing-area/10000
	C-P362	ps_qty_per	ps_qty_per * housing-area/10000
	C-P363	ps_qty_per	ps_qty_per * housing-area/10000
	C-S330	ps_qty_per	sheets-small
	C-S332	ps_qty_per	sheets-large
	C-S333	ps_qty_per	sheets-small
	C-S335	ps_qty_per	sheets-large

Variant Routing Rule Maintenance

Use Variant Routing Rule Maintenance to define selection and assignment rules for operations in the generic routing. If no selection rule has been defined for an operation in the generic routing, the operation will always be selected into the variant product structure.

Exercise 23: Variant Routing Rule Maintenance

Run Variant Routing Rule Maintenance and select configurable item C-F200.

The system now lists all the operations in the item's generic routing. Again, this screen has two parts: Selection Rule and Assignment Rule. In the former you define when a certain operation is to be selected. In the latter you can assign values to all fields in QAD Enterprise Applications Routing Operation Detail table (ro_det). You can see all the available fields by using the Insert/Update button and then clicking on the browse.

If you do not enter a Selection Rule, the operation will always be selected. If you leave the Assignment Rule empty, the system will copy the values from the generic routing into the variant routing.

Now add the Selection and Assignment Rules as listed in the table. The first Assignment Rule says: if backup is yes then the runtime for operation 20 is 0.2 hour; in every other case the runtime is 0.1 hour. The second Assignment Rule says: if housing-length, housing-width and housing-height exceed 80, 100 and 150 respectively, then the runtime for operation 10 is 0.2 hour; in other cases it is 0.1 hour. The third assignment rule updates the operation description of operation 30 with the color of the paint to use.

Configurable Item	Operation	Selection Rule	Field	Assignment Rule
C-F200	30		ro_run	if backup = yes then 0.2 else 0.1
C-S320	10		ro_run	if housing-length > 80 and housing-width > 100 and housing-height > 120 then 10.0 else 15.0
	30	stainless-steel = No	ro_desc	"Paint Shop, Color:" + housing-color

Notice that the operations for C-F200 are always selected. The same is true for operation 10 and 20 of item C-S320. Operation 30 for item C-S320 is only selected if stainless-steel is No.

Exercise 24: Variant Item Data Rules Maintenance

Features can also be used to populate comments in the variant routing. Those comments can provide additional instructions and information to the personnel operating the assembly line.

Use Routing Maintenance (14.13.1) in the Manufacturing module to enter the following comment for Routing Code C-S320 and Operation 10. Enter yes in the Comment field of this operation and then add the following comments:

Please Note:

The length of the housing is: [housing-length]

The width of the housing is: [housing-width]

The height of the housing is: [housing-height]

When the variant routing is created, QAD Configurator replaces the placeholders with the actual value of the feature.

Element Roll-Up Rule Maintenance

Using the element roll-up rules it is possible to calculate (roll-up) non-cost related data elements in a variant product structure/routing created by the questionnaire. Because QAD Enterprise Applications contains a special routine to roll up costs, Element Roll-up Rule Maintenance is not designed to roll up cost element related data.

The roll-up can be composed of:

- Item data (pt_mstr)
- Operation data (opm_mstr)
- Product structure data (ps_mstr)
- Routing data (ro_det)

Some examples of data that can be rolled up are: runtimes, selling prices, weights, numbers and sizes.

Roll-up rules can be executed one level up or all levels up and can consist of:

- Simple expressions containing a single element; for example: roll up pt_mfg_lead, which rolls up the production lead time of all components
- Complex expressions containing calculations; for example: roll up (component: pt_abc_qty / master: pt_dec01) * ps_qty_per

When rolling up data through all levels of the variant product structure, QAD Configurator will not store intermediate results in lower level configurable items. Only the total will be stored with the variant item.

The next diagram shows examples of a one level roll-up (to the nearest parent item) and an all-level roll-up (to the uppermost parent item) for a variant product structure. A variant routing is handled similarly.

Exercise 25: Element Roll-up Rule Maintenance

Run Element Roll-Up Rule Maintenance and enter the rule as listed in the table. It says that the net weights of all components (taking into account their quantities in the product structure) are to be rolled up into the net weight of the end product (the new variant item).

Use Element Rule Roll-Up Maintenance to create the following element roll-up rule for item C-F200, C-S320 and C-S410:

Field	**Entry**
Master Element	pt_net_wt
Take Product Structure Qty's into Account	Yes
Rule Type	Basic
Roll-Up Type	Product Structure
Roll-Up Data	Item
Roll-Up Element	pt_net_wt

Configuration Analyzer/Cross Validation Analyzer

Before we can run the questionnaire to start the configuration process, we must check the sales configuration rules we have entered in order to identify any inconsistencies. The Configuration Analyzer will perform this task for us. It will also include all features and rules in the building up of the sequence of questions in the questionnaire.

The Cross Validation Analyzer does the same validation on the product configuration rules and also matches all product configuration definitions and rules with the features and rules in sales configuration. This analyzer detects any discrepancies between the two modules and produces a report.

Exercise 26: Configuration Analyzer and Cross Validation Analyzer

Run the Configuration Analyzer for the Industrial Refrigerator now. Review the report to ensure no errors occurred (in case of errors, please verify your setup, following the suggestions of the report).

Run the Cross Validation Analyzer for the Industrial Refrigerator as well. Leave all check boxes the way they are. Review the resulting report and solve the inconsistencies, if any.

Chapter 5

Configurator Questionnaire

In this chapter we will practice with the questionnaire. There are two ways you can launch the questionnaire.

- Use Configurator Questionnaire.
- Select a configurable item in the order line in Sales Order Maintenance (7.1.1) or Sales Quote Maintenance (7.12.1) in the Sales Order/Invoices module. The Questionnaire window is automatically launched. Selecting a variant item in the order line does not trigger the product configuration process.

The process of configuring a variant item consists of three phases:

- You answer the questions in the questionnaire.
- QAD Configurator stores these answers as a configuration in the QAD Configurator database.
- QAD Configurator creates a variant item, variant product structure and/or a variant routing and stores it in the QAD Enterprise Applications database.

The questionnaire coordinates the whole process.

Questionnaire Sequence Maintenance

The sequence in which questions are presented in the questionnaire is determined by the Configuration Analyzer. Questionnaire Sequence Maintenance lets you manually rearrange the questions.

Exercise 27: Questionnaire Sequence Maintenance

Run Questionnaire Sequence Maintenance. Select configurable item C-F200 and use the buttons on the toolbar to define the order in which you want the features to be displayed and save your changes.

Exercise 28: Configurator Questionnaire

Run Configuration Questionnaire. Select the Industrial Refrigerator (C-F200), leave the Customer field blank and click the OK button. QAD Configurator will now present a list of Configuration IDs of previously created configurations, along with their variant item number (if available) and some other characteristics. If there are no existing configurations, the list is empty.

Choose New Configuration to indicate that you want to create a completely new configuration. The window you are looking at now contains the actual questionnaire. The left section of the screen displays the questions specified using the programs in the Sales Configuration menu. On the right side you can see a summary panel.

If you defined some variables (features) as background or temporary variables, you can keep these from being displayed in the questionnaire. To customize the questionnaire, click the Customize icon next to the message bar in the Configure Item screen. You can customize the questionnaire settings to display temporary and background questions as well, and show questions in the long question format.

To automatically answer the questionnaire, click the Answer All button to answer all the questions using their default options. For questions with no default answers, the first option will be used. Errors occur when you provide an invalid value for an answer or when your answer violates option dependency rules. When this happens, an alert icon appears next to the question and the message bar displays relevant error messages. You must fix all errors to successfully complete the questionnaire.

Now create a new configuration by answering the questions. Note how the answer to one question can affect the list of feasible answers to other questions.

When you have answered all questions click the View Summary button. The Configuration Summary screen lets you review the answers you have provided so far, save your configuration, and view similar configurations, and finally create and order a variant item based on your configuration.

To submit your completed configuration, click the Save Configuration button at the bottom of the Configuration Summary screen. A new configuration record is created with a new configuration ID.

Note Different combinations of configuration-selection, auto-select, and configuration-retention values in Configurable Item Maintenance determine how the system behaves when a configuration is saved and how variant items are created.

Your current configuration is displayed on the left of the Existing Configurations screen with all the configurable item questions and the answers you have provided.

Create a new variant from your new configuration by clicking the “C” icon on the Variant Item row.

Exercise 29: Verifying the structure of the Variant Item

We will now check whether or not the data resulting from the configuration process has been stored correctly in the QAD Enterprise Applications database.

Run Product Structure Inquiry (13.6) in the Manufacturing module.

Enter the item number of the created variant of the Industrial Refrigerator (C-F200) and verify that the correct items have been selected from the generic product structure by comparing the items to the answers and the selection rules that you entered in the exercises on product configuration rules. Also verify that the weights have been rolled up in the new item master, according to the exercise on Element Roll-Up Rule Maintenance.

Run Routing Maintenance (14.13.1) in the Manufacturing module to check if the system has selected the correct operations. Also check whether the routing comments have been updated for the variant of item C-S320.

Exercise 30: Starting the Questionnaire from Sales Order Maintenance

Run Sales Order Maintenance (7.1.1) in the Sales Orders/Invoices module. Enter a new sales order for your selected customer. When you get to the sales order line, enter C-F200 in the Item Number field. The system will automatically launch the questionnaire.

Exercise 31: Examining the Questionnaire

Run Configuration Questionnaire. Enter item number C-F200 but leave the Customer field blank. Click OK. Choose New Configuration to indicate that you want to create a completely new configuration. You will now see the actual questionnaire. By answering the questions in the list you in fact define the characteristics of the product you need. We will now examine this list and discuss its characteristics.

Note The exact characteristics depend on the set of exercises you went through. If you skipped some of them, the questionnaire may look different to the one discussed here.

The questionnaire has the following characteristics:

- The current group (Master Group Maintenance) and the item for which the questionnaire is run are shown in the title bar of the screen. So is the customer when the questionnaire is launched from Sales Order Maintenance or Sales Quote Maintenance.
- Although the questionnaire is run for item C-F200, it also shows the questions associated with the features of items C-S320 and C-S410. This is because the questions of all lower level configurable items are always collected at the level of the item for which the questionnaire is run.

- The questions are ordered according to the feature sequence you specified. However, due to dependencies resulting from the rules you entered, the system may have changed this original order.
- The questions display on the Technical Specs, Style and Size and Accessories tabs. The tabs correspond to the functional groups assigned to the features. Features that do not have an assigned functional group display on the No Group tab.
- Place the cursor over the Question icon to display the rules that apply to a feature.
- Click the Customize icon next to the message bar in the Configure Item screen. You can customize the questionnaire settings to display temporary and background questions as well, and show questions in the long question format. When you deselect the check box Show Background Questions, some questions will disappear (power-converter). The remaining ones are the foreground questions (the ones that have question type Normal); those that have disappeared are the background questions (question type is Special). When you select the check box again they will reappear.
- The variable housing-area is a temporary variable. This means that its value cannot be manipulated. A temporary variable should get its value from a rule. If there is no specific rule available the system will use the default value as the answer to the associated question. You can use this kind of variable to let the system calculate a value in the background that you want to have available when you are running the questionnaire. To display temporary variables in the questionnaire you must select the Show Temporary Questions check box in the Customize window.

Exercise 32: Show Existing Configurations Option

You can customize the configuration process using the Show Existing Configurations option in Configurable Item Maintenance. Its value determines whether and how the Existing Configurations screen is displayed in the questionnaire. The following options are available:

- First: Display existing configurations on launching the questionnaire.
- Second: Display the new configuration on launching the questionnaire.
- On request: When launching the questionnaire, display a message asking the user whether to show existing configurations.
- No: Hide the Existing Configurations tab in the questionnaire.

Experiment with this feature and select your preferred value.

Chapter 6

Pricing

In this chapter we will look at the QAD Configurator pricing functionality. The pricing functionality calculates the price of a configuration while you are defining that configuration in the questionnaire. This lets you base the answers that you give on the price of the configuration as it is at that moment.

In many situations the price of a configuration is equal to the sum of the prices of its components. Now suppose that each component is only chosen if a certain option is selected as an answer (a one-to-one relationship between the options and the components). Instead of assigning a price to a component, an alternative approach is to assign a price to the associated option and sum the prices of the options. This is the method QAD Configurator uses.

To assign a price to an option you must define a pricing part for that option. QAD Configurator will use the price and price lists (if any) of this pricing part to find the best net price and the best list price of the feature option. Any item can serve as a pricing part. QAD Configurator uses the standard QAD Enterprise Applications “best pricing” engine to determine the best list and net price of a pricing part.

If there is a one-to-one relationship between the options and the components, then all QAD Configurator has to do is sum the prices assigned to the selected options. But if selecting a certain option leads to selecting more than one unit of a component, then you may want to incorporate the price of this component that same number of times in the price of the configuration. How you can do this depends on the type of the feature to which the option belongs.

For numeric and numeric list features you can tell QAD Configurator to interpret the value of this feature as the number of units of the component. You do this by selecting the Quantity Based check box in Variable Maintenance or Feature Maintenance. If you do not select this check box QAD Configurator will act as if only one unit of the component is added to the configuration.

For all other types of features the Quantity Based check box is not available. In these cases you can use a pricing rule. This is a special type of rule in which the pricing quantity (pricing_qty) attribute of the feature is set. QAD Configurator interprets the value of this attribute as the number of units of the component. If you do not define a pricing rule a quantity of 1 is used.

The general case shown so far can be extended very easily. To see that the pricing functionality offers many more possibilities for defining the price of a configuration, you should realize that:

- The pricing part of an option does not have to be the component that is selected if you choose that option. This means you can assign any price you want to an option by specifying a dummy item and using that item as a pricing part for the option.

- If a pricing part is not the component that is selected when you choose an option, then the number of units is not the number of units of the actual component, but the number of units of the item that serves as the pricing part. In fact, the pricing quantity is only used to help you find a price in a price list and thus it does not even have to refer to a number of units that is selected in the variant product structure. This means that you can force the price of a configuration to go up when a certain option is selected, even if you do not want the choice to result in the selection of a component.
- If one or more components are always selected (independent of the answers given) then you can define a separate price or separate price lists containing the total price of this collection of items and link these to a dummy item. Then you can use this dummy item as a pricing part and make sure that its price is always incorporated in the price of the configuration, for instance by having a rule that makes sure that the relevant option of this (dummy) feature is always selected.
- If choosing a certain option means that more than one different component is selected, then you can create a new price or new price lists containing the prices of the relevant collection of components and link these to the pricing part that you associate with the option.

Apart from a pricing part and a pricing quantity, you also need to provide a pricing unit of measure to the engine that calculates the best prices. The pricing quantity of a pricing part associated with an option is always expressed in terms of the pricing unit of measure you enter in QAD Configurator. For example, if the unit of measure of an item or a price list is grams and the unit of measure as entered in QAD Configurator is kilograms, then a pricing quantity of 2 in the questionnaire means a quantity of 2 kilograms. As QAD Configurator calls the standard QAD Enterprise Applications “best pricing” engine, the alternate unit of measure, the conversion factor and the prices and price lists for the original unit of measure are used in the normal way to calculate the price of 2 kilograms in the questionnaire.

So far we have discussed pricing part, pricing quantity, quantity based and unit of measure. You enter pricing part, quantity based and unit of measure in Variable Maintenance and Feature Maintenance. In general the data entered in Feature Maintenance is used, but there are two exceptions to this rule:

- If Std Options is selected in Feature Maintenance, the data from the variable option is used.
- If the feature is a logical and the answer in the questionnaire is equal to no, then QAD Configurator uses 0 as the price for the feature. If the answer is yes, then QAD Configurator uses the pricing information as specified in Feature Maintenance.

The way the pricing functionality works is partly guided by a number of check boxes in Configurable Item Maintenance. The exercises will explain their meaning and help you to understand the details of the pricing functionality. They also contain additional general information on some check boxes that are associated with the pricing functionality.

Note The price of the configuration as shown in the questionnaire is always the price of one unit of the configuration.

When QAD Configurator creates a variant item it also stores two new price lists in the QAD Enterprise Applications database: the best list unit price of the variant item and the best net unit price of the variant item. QAD Configurator needs the information in these price lists to complete fields on the sales order line.

Pricing: Use Pricing Without Pricing Rules

Exercise 33: Use Pricing Without Pricing Rules

Before you start entering data, please read the flow of the exercise:

- In this example we calculate the price of a variant of item C-F200. We will base the price of a variant item on the volume of the refrigerator and use the remaining items to illustrate the pricing functionality.
- To include the volume of the refrigerator in the price of the variant item, we assign a pricing part to the variable volume. As volume is a numeric variable, we will select the Quantity Based check box in Variable Maintenance to tell QAD Configurator to interpret the value entered in the questionnaire as the number of units of the component.
- The prices of the remaining components are incorporated by linking these items as pricing parts to the options that guide the selection process as specified by the selection rules in Variant Product Structure Rule Maintenance.
- This exercise does not contain pricing rules. The use of pricing rules is illustrated in the next exercise.

The following items in the generic product structure have selling prices defined in Item Master Maintenance:

Item Number	Description	Price
C-S310	Battery, Alkaline	150.00
C-S311	Battery, Nickel-Cadmium	180.00
C-S312	Battery, Lithium-Sulfur	252.00

The appendix lists items C-M200 to C-M208, which have been created as pricing parts.

Note QAD Configurator supports “best pricing” so you can also use Price List Maintenance (1.10.1.1.) in the Master Data module to define list prices and discounts for pricing parts.

Run Variable Maintenance and add the following pricing information to volume:

Variable	Pricing Part	UM	Quantity Based
volume	C-M200	LT	Selected

Run Variable Maintenance and add the following pricing information to the existing options:

Variable	Option	Pricing Part	UM
backup-type	Alkaline Battery	C-S310	EA
	NiCd Battery	C-S311	EA
	LiS Battery	C-S312	EA
coolperform	High Performance	C-M204	EA
housing-type	Double Doors Front	C-M205	EA
	Toploader	C-M208	EA
temprange	Cooler	C-M201	EA
	Freezer	C-M202	EA
	Super Freezer	C-M203	EA

Use Variable Maintenance to enter pricing data for the logical variables:

Variable	Option	Pricing Part	UM
icemaker	Yes	C-M207	EA
stainless-steel	Yes	C-M206	EA

Note You must run Feature Maintenance to specify pricing information for the feature options that do not have Std Options selected. It is not necessary to Run Feature Maintenance in this exercise because all the feature options we are using for pricing have Std Options selected.

Run Variable Maintenance and define two new numeric variables in which the total best list unit price and the total best net unit price of the configuration can be stored.

Variable	Data Type	Extent	Question/Temporary	Question Type	Functional Group
config-blup	Numeric	1	Question	Normal	Technical Specs
config-bnup	Numeric	1	Question	Normal	Technical Specs

Now run Configurable Item Maintenance. Select the Industrial Refrigerator (item C-F200) and enter the data shown below.

Item	Calculate Configuration Price	List Price Variable	Net Price Variable
C-F200	Selected	config-blup	config-bnup

The last two entries tell QAD Configurator to store the best list unit price and the best net unit price of the configuration in the variables config-blup and config-bnup respectively. QAD Configurator automatically converts the variables config-blup and config-bnup to features of the item so you do not have to link them to an item yourself first. You can use these features for all kinds of purposes; for instance, for calculations or to assign one of these prices to the Price field of the variant item (using Variant Item Data Rule Maintenance).

Run the Configuration Analyzer for item C-F200.

Run Variant Item Data Rule Maintenance to tell the system to store the best net price of the configuration in the pt_price field of the variant item by entering the following assignment rule.

Item	Field	Assignment Rule
C-F200	pt_price	config-bnup

Now run Configuration Questionnaire for item C-F200 and select New Configuration.

Answer the questions for temperature range, style, length, width, height, backup type and icemaker.

Answer the questions for power-converter, backup and paint-housing. While you do so, check the following:

- View the Summary pane. The volume price is included in the price of the configuration.
- The price of the configuration in the Summary pane changes when questions on the temperature range, style, length, width, height, backup type, and icemaker are answered. The price is updated by the price of the new option selected based on the price of the pricing part.
- The price of the configuration in the Summary pane only increases by the price of one unit of the selected battery. The product structure states that 4 batteries are required, which means the price of 4 batteries should be added to the configuration price. The price of multiple batteries will be included in a later exercise using a pricing rule.

- Even though the question type of the features config-bnup and config-blup is normal, these two features do not display in the questionnaire.
- Click the Customize icon next to the message bar in the Configure Item screen. A Customize screen displays. Experiment with the different values in the Price Type list.
  - List Price: Displays the best list price of the pricing part associated with the current option multiplied by the current value of the pricing quantity.
  - Net Price: Displays the best net price of the pricing part multiplied by the current value of the pricing quantity.
  - Discount: The discount percentage for the option displays. The discount in the Summary pane displays the discount percentage for the total configuration including only the questions that are answered.
  - Manual Price List: Displays the ID of any manual price lists that have been selected. Manual price lists are covered later in the training.
- The price of the configuration displayed in the questionnaire is always the price of one unit of the configuration.

Now make sure that Price Type is set to Net Price, answer all questions, memorize the price of the configuration as shown in the Summary pane, and create a new variant item.

Finally run Item Master Inquiry (1.4.2) in the Master Data module for the created variant item and check that the net price of the configuration is now stored in the Price field of the variant item.

Some points to be aware of:

- If you start the questionnaire from the sales order line and enter the quantity ordered, then the List Price, Discount and Net Price fields on the sales order line are automatically filled with the values for one unit of the variant item.
- The price displayed in the Summary pane can differ from what you expect because unseen background features (if any) can have pricing information as well.
- You can view the temporary and background features by selecting the Show Temporary Questions and Show Background Questions check boxes in the Customize screen.
- It is not compulsory to enter a variable in the List Price Variable and Net Price Variable fields in Configurable Item Maintenance. If you do not enter anything, the best list unit price and the best net unit price of the configuration are still calculated and displayed in the Summary pane but not stored.

Pricing: Use Pricing With Pricing Rules

You can compose pricing rules for text, date, logical, and element type variables. A pricing rule is a special type of rule that sets the value of the attribute pricing_qty of a feature. Pricing rules are used to set the quantity to be used by the QAD pricing engine for non-numeric features. The right side of the THEN, ELSE or ASSIGN statement does not contain an option as in the rules you have seen so far, but they contain a numeric feature or a formula that yields a numeric value.

Exercise 34: Pricing with Pricing Rules

We will now create a pricing rule for the batteries (items C-S310, C-S311 and C-S312). In the generic product structure of C-F200 each battery has a product structure quantity of 4. This means that when a battery is selected in the questionnaire, the price of 4 batteries should be added to the configured price.

Run Item Rule Maintenance and enter the following rule.

Item	Rule ID	Rule
C-F200	IR200	Assign backup-type:pricing_qty = 4

Start the Configuration Analyzer and analyze item C-F200.

Now run Configuration Questionnaire for item C-F200 and select New Configuration.

Answer the questions for backup and battery type.

- The batteries have a pricing quantity of 4.
- The option N.A. does not have a linked pricing part and therefore does not have a price.

Pricing: Numeric List Example

Let us assume the product structure of item C-F200 has 10 Alkaline, 6 Nickel Cadmium and 4 Lithium Sulphur batteries. In this scenario we want the price of 10, 6 or 4 batteries to be added to the configuration price. One approach is to use a numeric list type variable where the variable options specify the required quantities.

Exercise 35: Pricing With Numeric Lists

Run Variable Maintenance and create the following variable.

Variable	Data Type	Extent	Functional Group	Question Type	Short Question	Question/ Temporary
battery-type	Numeric List	1	Accessories	Normal	Battery Type	Question

Enter the following values on the Variable Options tab

Seq	Option	Short Answer	Pricing Part	Qty Based	UM
1	10	Alkaline Battery	C-S310	Selected	EA
2	6	Nickel-Cadmium Battery	C-S311	Selected	EA
3	4	Lithium-Sulfur Battery	C-S312	Selected	EA
4	100	N.A		Not selected	

Run Feature Maintenance and make this new variable a feature of item C-F200.

Note Select Std Options so the variable options are copied to the feature.

Run Item Rule Maintenance and enter the following rule.

Item	Rule ID	Rule
C-F200	IR210	If backup = No then battery-type = 100. else battery-type <> 100

Start the Configuration Analyzer and analyze item C-F200.

Now run Configuration Questionnaire for item C-F200 and select New Configuration.

Answer the questions for backup and battery type.

- The batteries have a pricing quantity of 10, 6 and 4.
- The option N.A. does not have a linked pricing part and therefore does not have a price.

Note The purpose of this exercise is to provide an example of a numeric list type variable and the quantity based pricing functionality. You can delete item rule IR210 and feature battery-type as they are no longer needed in this training.

Pricing: Allow Net Price Changes

The check box Allow Net Price Change in Configurable Item Maintenance enables you to change the calculated net price for an option while you run the questionnaire.

Exercise 36: Net Price Changes

Run Configurable Item Maintenance. Select the Industrial Refrigerator (item C-F200) and select the check box Allow Net Price Change. Leave the other data intact.

Item	Allow Net Price Change
C-F200	Selected

Start the Configuration Analyzer and analyze item C-F200.

Now run Configuration Questionnaire for item C-F200 and select New Configuration.

Click the Customize icon next to the message bar in the Configure Item screen. A Customize screen displays. Make sure that Price Type is set to Net Price.

Answer the questions for temperature range, style and backup type. While you do so, check the following:

- The net price displays next to the feature option. This net price field contains the unit net price of the pricing part associated with the option.
- You can change the value of the net price manually. To do so move the cursor over the net price field and double-click. A Pricing window displays. You can update the Net Price field in the Pricing window.

The new net price value is included in the Net Price in the Summary pane when the question is answered.

Pricing: Manual Price List Selection

The check box Allow Manual Price List Change in Configurable Item Maintenance enables you to select a manual price list for an option when running the questionnaire. If the manual price list is valid for the pricing part that is linked to an option, QAD Configurator takes this price list into account when it determines the best net unit price and the best list unit price for that option. If the manual price list you select is not valid for the pricing part of the option, then QAD Configurator disregards the manual price list and uses the other applicable price lists (if any) to calculate the best prices.

Exercise 37: Manual Price List Selection

Use Price List Maintenance (1.10.1.1) in the Master Data module to define the manual price list shown in the table below. Item C-M207 is the pricing part for the icemaker.

Price List	Item/Analysis Code	Currency	Amount Type	Quantity Type	Comb Type	Manual	Min Qty	Net Price
MPM207	C-M207	USD	Net Price	Quantity	Base	Selected	1	145.00

Run Configurable Item Maintenance and select the check box shown below. Leave the other data intact.

Item	Allow Manual Price Change
C-F200	Selected

Now run Configuration Questionnaire for item C-F200 and select New Configuration.

Go straight to the question for the icemaker in the questionnaire. The manual price list in the table below is available for the icemaker Yes option.

Feature	Option	Manual Price List
Icemaker	Yes	MPM207

Move the cursor over the net price field of the Yes option of the Icemaker and double click. A Pricing window displays. The pricing Window now contains a Manual Price List field. Select the appropriate manual price list. The system considers the selected manual price list and calculates a new net price. Click the Save button in the pricing window to accept the new net price.

Pricing: Store All Pricing Info

The check box Store All Pricing Information in Configurable Item Maintenance lets you choose between storing the pricing information for all options or storing only the pricing information of the chosen options when creating a configuration.

If you deselect Store All Pricing Information and create a configuration, only the best net unit price and the best list unit price for each chosen option are stored in the database. But if you select Store All Pricing Information and create a configuration, both prices are stored for all possible options of all features. Obviously if you have a lot of options this causes the database to grow very fast and may cause performance problems. Therefore, it is recommended not to select this check box unless it is absolutely necessary.

We will not experiment with this option in this training.

Chapter 7

Additional Subjects

Configurable Item Data Copy

You can use Configurable Item Data Copy to copy the features and rules attached to an existing configurable item to another configurable item in the same group.

Exercise 38: Configurable Item Data Copy

Use Item Master Copy (1.4.12) in the Master Data module and copy item C-F200 to item C-F200X.

Run Configurable Item Maintenance and define a new configurable C-F200X.

Now run Configurable Item Data Copy to copy all the features and rules from C-F200 to the new configurable item.

Source Item	Target Item
C-F200	C-F200X

When you have done this, activate some of the reports or menu programs to check the result of the copy function.

Note Please be aware that fields in the source configurable item (such as Configuration Selection, Show Existing Configurations and Cost Set) are not copied to the target item. You must use Configurable Item Maintenance to set fields in the target configurable item record to their required values.

Displaying Warning Messages in the Questionnaire

When constructing sales configuration rules, you can define warning messages to display when a particular rule condition is met during the questionnaire entry process.

To define a warning message:

- Define a logical type variable.
- Create a sales configuration rule and assign the following function to the logical variable:

  ```
  showMessageBox(title, message)
  ```

  Where title is the title of the warning message box and message is the warning message you want to display.
- Attach the rule to an item. When the system processes the rule in the questionnaire, the warning message will appear.

In the next exercise we will display a warning message in the questionnaire if the user selects the cooler temperature range on a refrigerator for Australia.

Exercise 39: Display a Warning Message in the Questionnaire

Run Variable Maintenance and create the following variable.

Variable	Data Type	Extent	Functional Group	Question Type	Short Question	Question/ Temporary
mess-var	Logical	1	Technical Specs	Normal	mess-var	Temporary

Run Feature Maintenance and assign this variable to configurable item C-F200.

Run Item Rule Maintenance and enter the following rule.

Item	Rule ID	Rule
C-F200	IR300	If temprange = Cooler and country = “AUSTRALIA” then: mess-var = showMessageBox (“WARNING”, “Cooler is not recommended for hot climates”)

Now run the Configuration Analyzer for item C-F200.

Run the questionnaire for item C-F200 and select New Configuration.

Select Temperature Range equals Cooler and Country equals Australia. The system displays the warning message “Cooler is not recommended for hot climates.”

Note This is a warning message only and does not prevent the user from continuing.

Variant Item-Site Records

The Variant Item-Site Record field in Configurable Item Maintenance is used to specify whether to create item-site data along with item master records when the system generates variants from the configurable item, and if so, which sites to use to create item-site data. The options are:

- None: The variants to be generated are non-site-specific and no variant item-site data will be created.
- Current Site Only: The system will generate variant item-site data specific to a particular site. If you choose this option, you must specify a valid site variable for creating item-site data in the Configuration Questionnaire. This variable is specified in the Site Variable field in Configurable Item Maintenance.
- All Sites: The system will generate variant item-site data specific to all the sites associated with the configurable item as defined in Item-Site Planning Maintenance.

Note The item-site data creation feature is enabled or disabled during system installation. See *Installation Guide: QAD Configurator* for details. When the item-site data creation feature is disabled, the Variant Item-Site Record and Site Variable fields are grayed. Enabling and disabling the item-site data creation feature during installation is not covered in this course.

Exercise 40: Variant Item-Site Records

Your company has decided to manufacture the Single Door Front and Double Door Front refrigerators in site TRAIN-C2 and the Toploader refrigerator in site TRAIN-C3. Sales orders for these industrial refrigerators will continue to be taken in site TRAIN-C1.

Run Variable Maintenance and create the following variable.

Variable	Data Type	Functional Group	Question Type	Short Question	Question/ Temporary	Variable Options or Data Format
config-site	Text	Style and Size	Normal	config-site	Temporary	TRAIN-C2 TRAIN-C3

Now run Configurable Item Maintenance and update the following items as described below.

Item	Variant Item-Site Record	Site Variable
C-F200	All Sites	

Item	Variant Item-Site Record	Site Variable
C-S320	Current Site Only	config-site
C-S410	All Sites	

Note QAD Configurator automatically converts the variable config-site to a feature of the configurable item. However, you should run Feature Maintenance to ensure that the variable options are copied to the features. They will only be copied automatically if Use Standard Options is enabled.

Run Item Rule Maintenance and add the following rule for item C-S320.

Item	Rule ID	Item-Specific Rule
C-S320	IR400	If housing-type = Toploader then config-site = TRAIN-C3 else. config-site = TRAIN-C2

Start the Configuration Analyzer and analyze item C-F200.

Run the questionnaire for item C-F200 and select New Configuration. Complete the questionnaire and create a variant item.

Run Item-Site Planning Inquiry (1.4.8) in the Master Data module and verify that system created item-site records for the variant items.

Element Variables

An element variable is directly associated with a field in a database table. You will see a variable of the element type, but, in the background, QAD Configurator changes the type so that the value of the variable can be compared to the value in the database. Comparisons require identical data types. QAD Configurator supports element variable links to two types of entities: Internal Entities, which are defaults within QAD Configurator, and External Entities, which you have to define using External Entity Maintenance.

An internal entity is an entity that is known by, and supported by, QAD Configurator. The following tables in the QAD Enterprise Applications database are internal entities:

- Item Master
- Customer Master
- Sales Order Master
- Sales Order Detail
- Sales Quote Header
- Sales Quote Detail

An external entity is a new entity, defined by the user using External Entity Maintenance. External entities will be covered in the next section.

Exercise 41: Element Variable and Internal Entities

In this exercise we will use an element variable to select specific information from the Item Master record associated with configurable item C-F200 and display it in the questionnaire.

Run Variable Maintenance and create the following variable.

Variable	Data Type	Extent	Functional Group	Question Type	Short Question	Question/ Temporary
confitemdesc	Element	1	Technical Specs	Normal	Configurable Item	Question

Enter the following values on the Data Format Tab.

Variable	Element Type	Entity	Field
confitemdesc	Internal	Configurable Item	pt_desc1

Run Feature Maintenance and make this new variable a feature of the C-F200.

Run Questionnaire Sequence Maintenance and make confitemdesc the first feature to be displayed on the Technical Specs tab.

Now run the Configuration Analyzer for item C-F200. Solve any inconsistencies then run the questionnaire for the Industrial Refrigerator and select New Configuration. You will see the product description displayed in the questionnaire.

External Entity Maintenance

This function allows you to select specific information from the QAD Enterprise Applications database or from the QAD Configurator database and to use it in the questionnaire. An external entity is a reference to a record in the database. After defining an entity you can create a new variable of the type element, link this variable to the external entity, and specify a field from the external entity record to be used. The correct record is determined by the selection rule defined for the external entity.

An external entity is a new entity, defined by the user using External Entity Maintenance.

Exercise 42: External Entity Maintenance

Suppose you want to run the questionnaire for the Industrial Refrigerator and show the ID and description of the product line of that item in the questionnaire.

This is how you find out what to do.

The description of the product line can be found in the field pl_prod_line of the pl_mstr table in the QAD Enterprise Applications database.

The pl_mstr table cannot be accessed directly in QAD Configurator. This means you that you must define an external entity.

Once the database and the table to be used are determined, you need a selection rule to select the correct record.

In this example, the record to be selected is the one for which pl_mstr.pl_prod_line equals the product line number of the Industrial Refrigerator.

In order to specify the selection rule, you will need another variable in which you store this product line number. This variable must be of the type element and must refer to the configurable item and to the product line field.

First run Variable Maintenance and define the following variable.

Variable	Data Type	Extent	Functional Group	Short Question	Question / Temporary	Question Type
pline-id	Element	1	Technical Specs	Product Line ID	Question	Special

Enter the following values on the Data Format Tab.

Variable	Element Type	Entity	Field
pline-id	Internal	Configurable Item	pt_prod_line

Now run External Entity Maintenance and enter the data as follows.

External Entity	Database	Table	Selection Rule
pline	qaddb	pl_mstr	pl_prod_line = pline-id

Note If required you can use the Rule Assistant to enter the selection rule.

The next step is to run Variable Maintenance and add the following variable.

Variable	Data Type	Extent	Functional Group	Short Question	Question / Temporary	Question Type
pline-desc	Element	1	Technical Specs	Product Line	Question	Normal

Enter the following values on the Data Format Tab.

Variable	Element Type	Entity	Field
pline-desc	External	pline	pl_desc

Finally use Feature Maintenance to add the new variables to the Industrial Refrigerator.

Item	Feature
C-F200	pline-id
	pline-desc

Now run the Configuration Analyzer for item C-F200.

Run the questionnaire for item C-F200 and select New Configuration. You will see the product line description displayed in the questionnaire.

Note You can view the product line ID by selecting the Show Background Questions check box in the Customize screen.

External Entity Rule Maintenance

Use External Entity Rule Maintenance to assign values to fields in databases defined as external entities.

We will not experiment with this function in this training.

Configurable Item Maintenance Cost Roll-Up

Cost roll-up enables you to calculate the costs of manufacturing an item. In order to do so QAD Enterprise Applications will take into account the various types of costs that appear in the product structure of the item. Because QAD Configurator adds the product structure of any items that you configure to the QAD Enterprise Applications database, the cost roll-up functionality is incorporated in QAD Configurator as well.

Calculating the costs for an item involves adding the following five types of costs:

- Material costs
- Labor costs
- Burden costs
- Subcontract costs
- Overhead Costs

The roll-up of the total costs consists of a routing cost roll-up and a product structure cost roll-up. Refer to the relevant QAD Enterprise Applications user guides for a detailed description of routing and product structure cost roll-up.

During configuration of a variant, QAD Configurator will calculate the costs of manufacturing the item. To see these costs, run Product Structure Cost Report (13.12.4) in the Manufacturing module for items C-F200 to C-S430 and the variant items. Enter the correct site (10000) and the correct cost set (Standard).

You can also use Item Master Maintenance (1.4.1) in the Master Data module to see the costs associated with items.

Element Roll-Up

As we have seen, you can use Element Roll-Up Maintenance to calculate (roll up) non-cost element related data. The roll-up calculation is made during the process of creating a variant product structure and/or a variant routing and the outcome is stored in a field belonging to this variant.

Element Roll-Up allows us to execute a calculation afterwards—that is, after the variant product structure or routing has been created. This can be useful if you want to change the original formula that was used in the calculation, or if you want to roll up other data that you did not think of or did not need when you created the variant.

Before you can run Element Roll-Up, you must first define the element roll-up rules for configurable items. You do this using Element Roll-Up Rule Maintenance.

The input to Element Roll-Up can either be variant items or configurable items for which you want to update all variants.

We will not experiment with this function in this training.

Manual Configuration Maintenance

Suppose that there are items in the QAD Enterprise Applications item and product structure tables that are valid variants (configuration descriptions), but which were not created using the QAD Configurator questionnaire. These variants do not have a configuration ID in QAD Configurator and can never be selected as existing variants. Using Manual Configuration Maintenance, it is possible to create this configuration description afterward and link it to the item in QAD Enterprise Applications.

Using Manual Configuration Maintenance is a way to enable QAD Configurator to substitute existing variants in a product structure, without having to go through the entire process of analyzing and answering all the questions in the questionnaire.

Note The variant that is linked to the configuration must be an item in QAD Enterprise Applications but cannot be a configurable item in QAD Configurator, since a configurable item can never be a variant of another configurable item.

We will not experiment with this function in this training.

Configuration Rebuild

Over time, new features can be introduced, existing features can become obsolete, and product structures can change. When this occurs existing configurations may need to be updated to reflect these changes.

You can use Configuration Rebuild to quickly make batch changes to multiple configurations and update variant items data without having to go through the questionnaire entry process. You can also reprice configurations as well as update variant product structures and routings for selected variant items during the rebuild process

The Configuration Rebuild function does not create new variant items from existing configurations. For configurations without variant items, only features and price information can be updated.

The system runs the following product configuration rules when rebuilding a configuration:

- Variant item data rule
- Variant product structure rule
- Variant routing rule

Currently, the system does not process sales configuration rules during configuration rebuilds.

Exercise 43: Configuration Rebuild

Sales of black refrigerators have been disappointing and market analysis has indicated that gray is a more popular color. Your company’s marketing department has decided to remove black as a standard color option and replace it with gray.

Run Configuration Browse to view your existing configurations. If you do not have a configuration with feature Color = Black you will need to create one for this exercise. Run the Configuration Questionnaire and select New Configuration. Select Color = Black. Complete the questionnaire and create a variant item.

Run Feature Maintenance for configurable item C-S320 (Industrial Housing) and update the feature housing-color as indicated below.

- Delete feature option Black.
- Add feature option Gray.

Use Item Master Maintenance (1.4.1) in the Master Data module to create the new item listed below.

Item Number.	UM	Description	Net Weight & Measure	Pur/Mfg	Price	Standard Material Cost
C-P364	LT	Paint, Gray	1.15 KG	P	0.00	5.40

Note You could create item C-P364 using Item Master Copy (1.4.12) and copying item C-P362 (Paint, Black)

As gray paint is replacing black paint we must:

- Update the generic product structure.
- Update the affected product configuration rules.

Run Product Structure Maintenance (13.5) in the Manufacturing module to update the product structure for the Industrial Housing (C-S320). Delete component C-P362 (Paint, Black) and add component C-P364 as indicated below.

Level	Component Item	Description	Quantity Per	UM
Parent	C-S320	Industrial Housing		EA
1	C-P364	Paint, Gray	0.75	LT

Run Variant Product Structure Rule Maintenance for configurable item C-S320 and enter the selection rules that are listed in the table below.

Configurable Item	Component	Description	Selection Rule
C-S320	C-P363	Paint, Other	housing-color <> “White” AND housing-color <> “Gray” AND housing-color <> “N.A.”
	C-P364	Paint, Gray	housing-color = “Gray”

Now we will update the existing configurations that have Color = Black.

Run Configuration Rebuild.

- Select configurable item C-F200.
- A Configuration Browse window is displayed. Use the search box to filter records and look up the configurations where Color = Black. Click OK to select all the configurations displayed in the browse.
- To make batch changes to features in all the selected configurations, select Feature Options. In the expanded box, specify changes to be applied to features of the selected configurations across the board during the rebuild process. Select Add/Update and assign housing-color = Gray.
- Select the Product Structure/Routing check box to update the product structures and routings of the variant items. Next specify whether you want to obsolete or delete the old product structures and routings.
- Select Show Detail to display detailed change information in the rebuild report.

- Click Rebuild. The system displays the number of configurations and variant items to rebuild and tells you that the rebuild process may take a long time. Click OK to start the rebuild process.

Run Configuration Browse to view your existing configurations. Verify that the configurations that previously had Color = Black now have Color = Gray.

Note Configuration Rebuild will only update the product structure of the selected configurable item. It will not update the product structure of the lower-level configurable items, such as C-S320. You must run Configuration Rebuild for item C-S320 is you want to update the product structure of C-S320.

Forecasting Configurable Items

Some companies have a requirement to forecast configurable items in order to effectively drive MRP. As configurable items are not sold, we need to consume the forecast of a configurable item when a confirmed sales order line for a variant item is created.

The recommended approach is to create a planning item (an item with Pur/Mfg = “F”) that represents a configurable item. This planning item would have the forecast for the associated configurable item. Using the industrial refrigerator as an example, C-F200 is a configurable item and C-F200-P would be the associated planning item. Variant Planning Item Rule Maintenance is used to link a configurable item to a planning item.

For the forecast of a planning item to be consumed, variant items must be components of the planning item’s product structure. When a new variant item is created using the Configuration Questionnaire, the system will add the variant item to the product structure of the associated planning item.

A variant item is added to the planning bill as a component with the following values:

- Structure Type = “P” (planning)
- Forecast Percent = zero to prevent MRP from generating planned orders for the components of the variant item from the forecast of the planning item.
- Quantity Per = 1

Because Structure Type = “P”, the system will consume the forecast of the planning item with the variant item order quantity on the sales order line when the sales order line is confirmed.

The planning bill can also contain the components from the configurable item’s generic product structure that are to be forecast. These components would be set up in the planning bill with Structure Type = “O” (option) and Forecast Percent set to the required value.

Exercise 44: Forecasting a Configurable Item

In this exercise we will illustrate how to create and consume the forecast of a configurable item.

Use Item Master Maintenance (1.4.1) in the Master Data module to create the new item listed below

Item Number	UM	Description 1	Description 2	Pur/Mfg
C-F200-P	EA	Refrigerator, Industrial	Planning Item	F

Run Forecast Maintenance (22.1) in the Manufacturing module and enter a forecast for item C-F200-P. Create this forecast in the default site of item C-F200-P. Forecast a quantity of 100 a week for this week and the next 3 weeks.

Now use Variant Planning Item Rule Maintenance to link the configurable item C-F200 to its associated planning item. In this exercise we will leave the selection rule blank.

Configurable Item	Planning Item
C-F200	C-F200-P

Run Sales Order Maintenance (7.1.1) in the Sales Orders/Invoices module. Enter a new sales order for your selected customer. When you get to the sales order line, enter C-F200 in the Item Number field. The system will automatically launch the questionnaire. Select New Configuration, complete the questionnaire and create a variant item. Order a quantity of 5 and complete the sales order line. Ensure that Consume Forecast is selected on the sales order line.

Run Forecast Maintenance (22.3) and verify that the forecast of C-F200-P has been consumed by the quantity ordered on the sales order line.

Run Product Structure Inquiry (13.6) in the Manufacturing module and view the product structure of planning item C-F200-P. Verify that the variant item created by the questionnaire in Sales Order Maintenance has been added as a component of the product structure of C-F200-P.

Deleting and Archiving Configurations

Each time you complete the questions in the questionnaire and click OK, QAD Configurator generates a new configuration in the database, containing all the answers to the questions for the configurable item. The configuration is created even if no variant is generated. As a consequence, the configuration table in the QAD Configurator database can grow rapidly

You can use Configuration Delete/Archive to archive one or more configurations to a file for later use, or permanently delete configurations from the set of configurations available in QAD Configurator.

This function lets you limit the set of available configurations in your QAD Configurator session by storing old configurations in a file or deleting them. This is a way to purge the configuration table, which will grow quite rapidly when you are creating configurations regularly. The available configurations are the ones that QAD Configurator will display when you are using the questionnaire. QAD Configurator will not be able access the configurations in the file.

We will not experiment with this function in this training.

Note When you enter no selection criteria in the fields all configurations, will be transferred or deleted.

Batch Compiler

While running, QAD Configurator uses temporary code tables based on the product configuration selection and quantity rules. Whenever these rules change, these tables must be changed as well to guarantee that QAD Configurator uses the most recent version of the rules. Normally, the variant generator, which is incorporated in the questionnaire, checks the validity of the files and creates new ones if necessary.

If there is doubt as to the validity of the objects, for example after a re-creation of the database, it is necessary to re-create all code files. Using the Batch Compiler, you can do this without investigating first whether it is necessary or not.

We will not experiment with this function in this training.

Rule Table Accelerator

Use Rule Table Accelerator to make an indexed search on one or more rule tables possible. If you do not accelerate a rule table, you cannot perform an indexed search on that table. When you accelerate a rule table the accelerator stores additional information needed for the indexed search in the database. Suppose that you use General Rule Table Maintenance to delete a rule table, and that you accelerated this same table sometime in the past. If QAD Configurator not only deleted the rule table itself, but also started searching the database for any corresponding additional information that may have become obsolete as a result, the deletion of the table would take quite some time. To avoid this, Rule Table Accelerator rather than General Rule Table Maintenance is responsible for deleting this information. It starts searching the database and deleting the information as soon as it has finished accelerating the tables you specified.

Rule Table Accelerator can operate on general rule tables or on item rule tables but it cannot accelerate both types of tables at the same time.

We will not experiment with this function in this training.

Configurator Reports

Most of the reports offer a way to get an overview of the information you entered in the associated function. You could also view this information within the function itself. However, a report is generally more useful, since it collects data that would otherwise be in subsequent windows and thus makes it easier to compare the data. Besides, the report programs make it possible to collect only data that meets certain selection criteria and sometimes even to influence the way it is presented.

Exercise 45: Configurator Reports

Now experiment a little with the various Configurator reports yourself.

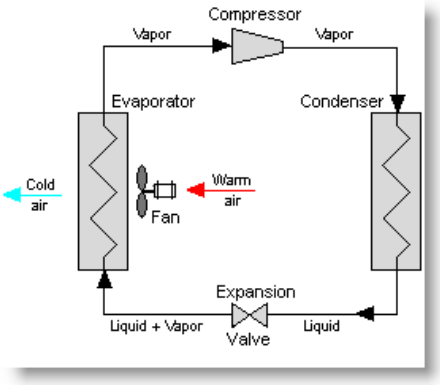
Appendix A

QAD Enterprise Applications Setup

QAD Enterprise Applications Setup

Domain: USA

The following table shows the generic product structure of the Industrial Refrigerator:



Use Item Master Maintenance (1.4.1) in the Master Data module to create the new items listed below.

Item Number	UM	Description	Net Weight & Measure	Pur/Mfg	Price	Standard Material Cost
C-F200	EA	Refrigerator, Industrial	0.00 KG	M	0.00	0.00
C-P361	LT	Paint, White	1.10 KG	P	0.00	4.80
C-P362	LT	Paint, Black	1.15 KG	P	0.00	5.40
C-P363	LT	Paint, other	1.00 KG	P	0.00	10.00
C-S145	EA	Icemaker, Industrial	4.80 KG	P	0.00	67.95
C-S210	EA	Power Cord, UK	0.62 KG	P	0.00	10.70
C-S211	EA	Power Cord, Australia	0.58 KG	P	0.00	9.80
C-S212	EA	Power Cord, USA	0.60 KG	P	0.00	10.40
C-S213	EA	Power Cord, Universal	0.80 KG	P	0.00	17.50
C-S310	EA	Battery, Alkaline	0.35 KG	P	150.00	12.50
C-S311	EA	Battery, Nickel-Cadmium	0.55 KG	P	180.00	24.00
C-S312	EA	Battery, Lithium-Sulfur	1.20 KG	P	252.00	58.00
C-S320	EA	Industrial Housing	0.00 KG	M	0.00	0.00
C-S330	EA	Sheet Steel, 80*120 cm	5.76 KG	P	0.00	23.04
C-S332	EA	Sheet Steel, 160*200 cm	19.20 KG	P	0.00	68.00
C-S333	EA	Sheet Stainless Steel, 80*120 cm	6.91 KG	P	0.00	36.86
C-S335	EA	Sheet Stainless Steel, 160*200 cm	23.40 KG	P	0.00	108.80
C-S410	EA	Control Unit	0.00 KG	M	0.00	0.00
C-S411	EA	Control Unit Motherboard	0.15 KG	P	0.00	42.50
C-S430	EA	Power Converter, Standard	1.50 KG	P	0.00	70.00
C-S431	EA	Power Converter, Smart	1.75 KG	P	0.00	142.50
C-S510	EA	Evaporator 20*40 cm	2.80 KG	P	0.00	24.00
C-S520	EA	Condenser 20*40cm	3.40 KG	P	0.00	26.50

Item Number	UM	Description	Net Weight & Measure	Pur/Mfg	Price	Standard Material Cost
C-S530	EA	Expansion-Valve	0.75 KG	P	0.00	28.00
C-S610	EA	Fan, 1200 Watt	4.50 KG	P	0.00	127.30
C-S611	EA	Fan, 1500 Watt	5.70 KG	P	0.00	148.00
C-S710	EA	Compressor, 100 lpm	4.00 KG	P	0.00	48.10
C-S711	EA	Compressor, 150 lpm	4.50 KG	P	0.00	48.80
C-S712	EA	Compressor, 250 lpm	5.40 KG	P	0.00	62.70
C-S820	EA	Transportation Box	6.4 KG	M	00.00	6.70
C-S910	EA	Refrigerant, Standard	1.24 KG	P	0.00	8.20
C-S911	EA	Refrigerant, Medic-Grade	1.44 KG	P	0.00	10.00
C-S912	EA	Refrigerant, Performance	1.52 KG	P	0.00	12.70

The following items are set up as pricing items. Please make sure that the Item Planning Data are set to:

- Mstr Sched: No
- Plan Order: No

Item Number	UM	Description	Net Weight & Measure	Pur/Mfg	Price	Standard Material Cost
C-M200	LTs	Pricing Item - F200 Option: Volume			0.50	0.00
C-M201	EA	Pricing Item - F200 Option: Cooler			800.00	0.00
C-M202	EA	Pricing Item - F200 Option: Freezer			1,400.00	0.00
C-M203	EA	Pricing Item - F200 Option: Super Freezer			2,400.00	0.00
C-M204	EA	Pricing Item - F200 Option: High Performance			550.00	0.00
C-M205	EA	Pricing Item - F200 Option: Double Doors			250.00	0.00
C-M206	EA	Pricing Item - F200 Option: Stainless Steel			500.00	0.00
C-M207	EA	Pricing Item - F200 Option: Icemaker			150.00	0.00
C-M208	EA	Pricing Item - F200 Option: Toploader			100.00	0.00

Run Product Structure Maintenance (13.5) in the Manufacturing module to definite the generic product structure for the Industrial Refrigerator (C-F200).

Level	Component Item	Description	Quantity Per	UM
Parent	C-F200	Refrigerator, Industrial	Refrigerator, Industrial	EA
1	C-S145	Icemaker, Industrial	1.0	EA

Level	Component Item	Description	Quantity Per	UM
1	C-S210	Power Cord, UK	1.0	EA
1	C-S211	Power Cord, Australia	1.0	EA
1	C-S212	Power Cord, USA	1.0	EA
1	C-S213	Power Cord, Universal	1.0	EA
1	C-S310	Battery, Alkaline	4.0	EA
1	C-S311	Battery, Nickel-Cadmium	4.0	EA
1	C-S312	Battery, Lithium-Sulfur	4.0	EA
1	C-S320	Industrial Housing	1.0	EA
1	C-S410	Control Unit	1.0	EA
1	C-S530	Expansion-Valve	1.0	EA
1	C-S820	Transportation Box	1.0	EA
1	C-S910	Refrigerant, Standard	1.0	EA
1	C-S911	Refrigerant, Medic-Grade	1.0	EA

Run Product Structure Maintenance for the Industrial Housing (C-S320).

Level	Component Item	Description	Quantity Per	UM
Parent	C-S320	Industrial Housing		EA
1	C-P361	Paint, White	0.7	LT
1	C-P362	Paint, Black	0.75	LT
1	C-P363	Paint, other	0.75	LT
1	C-S330	Sheet Steel, 80*120 cm	1.0	EA
1	C-S332	Sheet Steel, 160*200 cm	1.0	EA
1	C-S333	Sheet Stainless Steel, 80*120 cm	1.0	EA
1	C-S335	Sheet Stainless Steel, 160*200 cm	1.0	EA
1	C-S510	Evaporator 20*40 cm	1.0	EA
1	C-S520	Condenser 20*40cm	1.0	EA
1	C-S610	Fan, 1200 Watt	1.0	EA
1	C-S611	Fan, 1500 Watt	1.0	EA
1	C-S710	Compressor, 100 lpm	1.0	EA
1	C-S711	Compressor, 150 lpm	1.0	EA
1	C-S712	Compressor, 250 lpm	1.0	EA

Run Product Structure Maintenance for the Control Unit (C-S410).

Level	Component Item	Description	Quantity Per	UM
Parent	C-S410	Control Unit		EA
1	C-S411	Control Unit Motherboard	1.0	EA
1	C-S430	Power Converter, Standard	1.0	EA
1	C-S431	Power Converter, Smart	1.0	EA

Use Work Center Maintenance (14.5) in the Manufacturing module to enter the following work centers.

Work Center	Machine	Description
CF200		Final Assembly
CS320		Housing Fabrication

Use Routing Maintenance (14.13.1) in the Manufacturing module to enter the following operations for Routing Code C-F200 and C-S320.

Routing Code	Operation Number	Work Center	Machine	Description of Operation	Setup Time	Run Time
C-F200	10	CF200		Assembly	2.0	10.0
	20	CF200		Programming	4.0	1.0
	30	CF200		Inspection	0.0	1.0
C-S320	10	CS320		Steel cutting	2.0	10.0
	20	CS320		Housing assembly	5.0	15.0
	30	CS320		Paint Shop	2.0	2.0