

# **Oracle® Agile Product Lifecycle Management for Process FlexSync Formulation Guide**

Release 6.2.4.x

**F57992-01**

May 2022

**ORACLE®**

# Copyrights and Trademarks

Agile Product Lifecycle Management for Process

Copyright © 2022, Oracle and/or its affiliates. All rights reserved.

The FlexSync Formulation Solution Pack is part of the Design Workbench Extensions that are included as part of Agile Formulation and Compliance for Process. The FlexSync Formulation Solution Pack cannot be used without the user having a license for Agile Formulation and Compliance for Process.

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, delivered to U.S. Government end users are "commercial computer software" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, use, duplication, disclosure, modification, and adaptation of the programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, shall be subject to license terms and license restrictions applicable to the programs. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information on content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services.

## Contents

<b>PREFACE.....</b>	<b>6</b>
Audience .....	6
Variability of Installations .....	6
Documentation Accessibility.....	6
Access to Oracle Support .....	6
Software Availability .....	6
<b>CHAPTER 1—FLEXSYNC FORMULATION OVERVIEW .....</b>	<b>7</b>
<b>CHAPTER 2—REPORTS .....</b>	<b>8</b>
Single Formula Quantity/Percent .....	9
Key Features.....	10
Prototype Experiments Quantity/Percent .....	11
Key Features.....	11
Best Practices .....	12
<b>CHAPTER 3—HANDLERS .....</b>	<b>13</b>
<b>CHAPTER 4—INSTALLING/UPGRADING FLEXSYNC FORMULATION .....</b>	<b>14</b>
Assigning User Roles .....	14
Template Location .....	14
<b>CHAPTER 5—CONFIGURATION .....</b>	<b>15</b>
Adding Additional Nutrients .....	15
Single Formula Reports .....	15
Prototype Experiments Reports.....	15
Adding Additional Extended Attributes .....	16
Single Formula Reports .....	16
Prototype Experiments Reports.....	16
Report Navigation .....	17
Customizing Reports for Specific Groups.....	17
For Performance .....	17
Trust Relationship .....	17
<b>CHAPTER 6—CREATING NEW REPORTS .....</b>	<b>18</b>

<b>APPENDIX A—ORACLE FUNCTIONS .....</b>	<b>19</b>
<b>APPENDIX B—DATA DICTIONARY .....</b>	<b>21</b>
Summary .....	21
Preferences .....	21
Cross References.....	22
Steps.....	22
Simple EAs.....	22
BOM Inputs .....	23
Consume from Step .....	24
BOM Outputs .....	25
Formulation Tags .....	26
Cross References – Inputs.....	27
Cross References – Outputs.....	27
Extended Attributes– Inputs .....	28
Extended Attributes – Outputs .....	28
Nutrients – Inputs .....	29
Nutrients – Outputs .....	29
Costs – Inputs.....	29
Costs – Outputs.....	30

## Preface

### Audience

This guide is intended for client programmers involved with integrating Oracle Agile Product Lifecycle Management for Process. Information about using Oracle Agile PLM for Process resides in application-specific user guides. Information about administering Oracle Agile PLM for Process resides in the *Agile Product Lifecycle Management for Process Administrator User Guide*.

### Variability of Installations

Descriptions and illustrations of the Agile PLM for Process user interface included in this manual may not match your installation. The user interface of Agile PLM for Process applications and the features included can vary greatly depending on such variables as:

- Which applications your organization has purchased and installed
- Configuration settings that may turn features off or on
- Customization specific to your organization
- Security settings as they apply to the system and your user account

### Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc>.

### Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info> or visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

### Software Availability

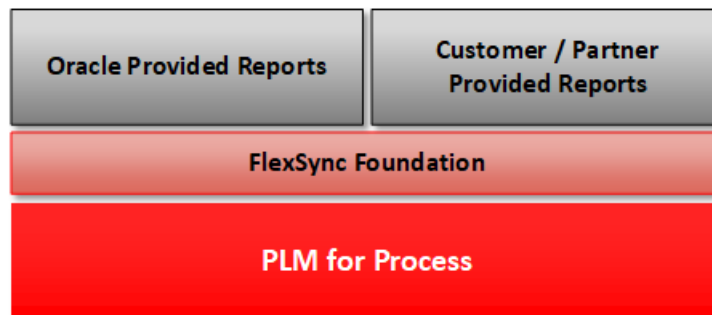
Oracle Software Delivery Cloud (OSDC) provides the latest copy of the core software. Note the core software does not include all patches and hot fixes. Access OSDC at:

<http://edelivery.oracle.com>

## Chapter 1—FlexSync Formulation Overview

FlexSync Formulation provides you the ability to export formulation specifications to Excel. You can now use a customized Excel user interface, allowing you to monitor important key attributes while adjusting the formulation Bill of Material (BOM) quantity values. Key attributes include nutrients, extended attributes, total moisture/solids and cost. Once you are finished, the BOM quantities can be imported back into the formulation specification.

FlexSync Formulation contains formulation handlers and out the box report templates built upon FlexSync Foundation. FlexSync Foundation more information can be found in the *Agile Product Lifecycle Management for Process FlexSync Foundation Guide*.

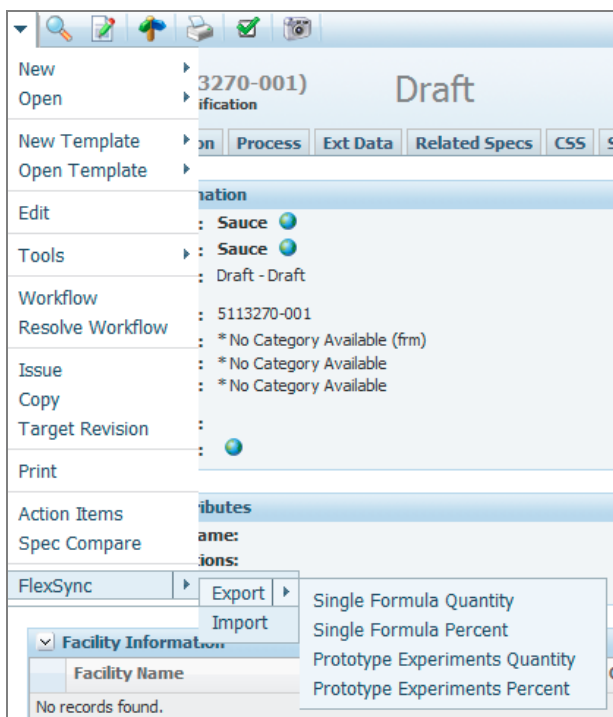


## Chapter 2—Reports

FlexSync Formulation includes 4 out of the box reports that can be used immediately. The following reports will be available from the formulation specification in the action menu.

1. Single Formula Quantity
2. Single Formula Percent
3. Prototype Experiments Quantity
4. Prototype Experiments Percent

These reports contain formulation data as well as working sheets. The working sheets use out of the box Oracle VBA functions to pull data from the 'From PLM4P' worksheet as well as perform calculations. For a full list of available functions see [Appendix A—Oracle Functions](#).



Each report includes 4 worksheets.

From PLM4P	<b>Prototype Experiments QTY</b>	To PLM4P	System
------------	----------------------------------	----------	--------

Sheet	Description
From PLM4P	Contains the data exported from PLM for Process. For a full list of exported data, please review to the data dictionary in <a href="#">Appendix B—Data Dictionary</a> . This data should not be edited.
Primary Working Sheet	This is the working sheet where all edits should occur. The name of this sheet will vary based on the report used during export.
To PLM4P	This sheet contains the data to be imported back into PLM for Process. BOM Quantities are currently the only data allowed to be imported back into PLM for Process. This data should not be edited; the primary working sheet will update this data.
System	This sheet contains system required data and configuration settings. This data should not be edited.



## Single Formula Quantity/Percent

*SingleFormulaQTY.xlsm, SingleFormulaPER.xlsm*

Sauce

Apr-28-2013 8:21:08 PM

														Refresh
Spec Number	Name	Qty	UOM	% Batch	EUR/100g	Cost	Moisture	Moisture Contribution	Calories (100g)	Calories Contribution	Fat (100g)	Fat Contribution	Brix (Base)	Brix Contribution
5077504-001	Salt - Granulated - Food Grade	20	kg	4.3478261	0.01472	2.944	0	0	0	0	0	0	0	0
5077502-001	Pepper - Red - Ground - 36-44M - Not So	300	kg	65.217391	0.23893	896.79	0	0	334	217.826087	18	11.73913043	45	23.34782609
5077485-001	Tomato Paste - Cold Break - 31% NTSS	100	kg	21.73913	0.03437	34.37	0	0	82	17.82608696	0.55	0.119565217	25	5.434782609
5077413-001	Vinegar - Distilled - White - 100 Grain	20	kg	4.3478261	0	0	22	0.956521739	69	3	0.1	0.004347826	2	0.086956522
5077511-001	Vinegar - Distilled - 120 GRAIN	20	L	4.3478261	0.01327	2.654	85	3.695652174	12	0.52173913	0	0	N/A	0
TOTAL		460	kg	100		936.76		4.65217391		239.173913		11.863043		34.86956522

The Single Formula reports allow you to modify quantity or percent values in a single grid. As BOM values are modified, key attribute values such as cost, moisture, nutrients, and distinct extended attributes are adjusted for each input and a total is provided.

**Key Features**

Feature	Description
Quantity and % Batch	The Single Formula Quantity report allows you to edit the formula based on quantity amounts. The Single Formula Percent report allows you to edit the % Batch amount.
Input UOM	Displays the UOM set for each BOM Input. Only Mass and Volume categories are supported for key value calculations.
Cost	The cost exported is based on your formulation settings Currency, Per UOM, Cost Set and Type. The report provides per input base cost and calculated cost.
Moisture Value and Contribution	The moisture value for each BOM Input as well as its contribution to the whole.
Nutrient Values and Contribution	Key nutrient values for each BOM Input as well as their contribution to the whole. Out of the box, the report includes calories, fat and sodium.
Extended Attribute Values and Contribution	Key extended attribute values for each BOM Input as well as their contribution to the whole. Out of the box, the report includes extended attribute ID 15 and 87. Extended Attributes need to be distinct and tagged with the “Is Design Attribute” tag.
Refresh	The refresh button will restore the formulation BOM back to the values originally exported.

These reports are easily configurable. If you would like to see additional nutrients or extended attributes, see [Chapter 5—Configuration](#) for more details.

## Prototype Experiments Quantity/Percent

*PrototypeExperimentQTY.xlsm, PrototypeExperimentPER.xlsm*

Sauce Apr-28-2013 9:05: Ref

**Formula**

Spec Number	Name	Control (QTY)	UOM	1	2	3	4	5	6	7	8	9	
5077504-001	Salt - Granulated - Food Grade	20	kg	25	22	15	20	20	20	20	20	20	
5077502-001	Pepper - Red - Ground - 36-44M - Not Steriliz	20	kg	20	20	20	20	20	20	20	20	20	
5077485-001	Tomato Paste - Cold Break - 31; NTSS	10	kg	10	10	15	10	10	10	10	10	10	
5077413-001	Vinegar - Distilled - White - 100 Grain	30	kg	30	30	30	30	30	30	30	30	30	
5077511-001	Vinegar - Distilled - 120 GRAIN	40	L	40	40	40	40	40	40	40	40	40	
<b>TOTAL</b>		<b>120</b>	<b>kg</b>	<b>125</b>	<b>122</b>	<b>120</b>	<b>120</b>	<b>120</b>	<b>120</b>	<b>120</b>	<b>120</b>	<b>120</b>	

**Key Values**

Name	Control (QTY)	UOM	1	2	3	4	5	6	7	8	9	
Total Calories	83.75	kcal	▼ 80.4	▼ 82.377049	▲ 87.166667	83.75	83.75	83.75	83.75	83.75	83.75	
Total Fat	3.070833333	g	▼ 2.948	▼ 3.020492	▲ 3.09375	3.070833333	3.070833333	3.070833333	3.070833333	3.070833333	3.070833333	3.070833333
Total Sodium	6568	mg	▲ 7877.28	▲ 7104.590164	▼ 4934.166667	6568	6568	6568	6568	6568	6568	
Total Moisture	33.83333333	%	▼ 32.48	▼ 33.278689	33.83333333	33.83333333	33.83333333	33.83333333	33.83333333	33.83333333	33.83333333	33.83333333
Distinct EA 87	39.25	%	▼ 37.76	▼ 38.639344	▲ 41.833333	39.25	39.25	39.25	39.25	39.25	39.25	
Distinct EA 15	10.08333333	¢/BRIK	▼ 9.68	▼ 9.918033	▲ 11.125	10.08333333	10.08333333	10.08333333	10.08333333	10.08333333	10.08333333	10.08333333

**Cost(100g)**  
**Cost Book (type + set)** Std Cost-FarmVenthFacility

Spec Number	Name	Control (QTY)		1	2	3	4	5	6	7	8	9	
5077504-001	Salt - Granulated - Food Grade	2.466	EUR	3.0825	2.7126	1.8495	2.466	2.466	2.466	2.466	2.466	2.466	
5077502-001	Pepper - Red - Ground - 36-44M - Not Steriliz	53.784	EUR	53.784	53.784	53.784	53.784	53.784	53.784	53.784	53.784	53.784	
5077485-001	Tomato Paste - Cold Break - 31; NTSS	3.437	EUR	3.437	3.437	5.1555	3.437	3.437	3.437	3.437	3.437	3.437	
5077413-001	Vinegar - Distilled - White - 100 Grain	49.605	EUR	49.605	49.605	49.605	49.605	49.605	49.605	49.605	49.605	49.605	
5077511-001	Vinegar - Distilled - 120 GRAIN	5.308	EUR	5.308	5.308	5.308	5.308	5.308	5.308	5.308	5.308	5.308	
<b>TOTAL</b>		<b>120.6</b>		<b>▲ 121.2165</b>	<b>▲ 120.8466</b>	<b>▲ 121.702</b>	<b>120.6</b>	<b>120.6</b>	<b>120.6</b>	<b>120.6</b>	<b>120.6</b>	<b>120.6</b>	

The Prototype Experiments reports allow you adjust values of a single formulation for up to 10 prototypes to compare adjusted values to the original exported formulation. As BOM values are modified, key attribute values such as cost, moisture, nutrients, and distinct extended attributes are adjusted for each input and a calculated total is provided. These reports include indicators allowing you to quickly see if a key value is increasing or decreasing from your starting formulation. Once finished, you can select one formulation to import back into PLM for Process.

### Key Features

Feature	Description
Quantity and % Batch	The Prototype Experiments Quantity report allows you to edit the formula based on quantity amounts. The Prototype Experiments Percent report allows you to edit the % Batch amount.
Input UOM	Displays the UOM set for each BOM Input. Only Mass and Volume categories are supported for key value calculations.
Cost	These reports allow you to change the cost set and type so you can see cost across multiple facilities. The currency, per UOM and the default cost selected is based on your formulation settings at the time of export.


Feature	Description
Moisture Value	The calculated moisture value for your output material.
Nutrient Values	Calculated key nutrient values for your output material. Out of the box, the reports include calories, fat and sodium.
Extended Attribute Values	Calculated key nutrient extended attribute values for your output material. Out of the box, the reports include extended attribute ID 15 and 87. Extended Attributes need to be distinct and tagged with the “Is Design Attribute” tag.
Refresh	The refresh button will restore the working sheet back to the values originally exported.

### Best Practices

1. Multiple variations of a formulation can be imported using Snapshots. For example, when using prototype experiments you can import prototype column 1, create a snapshot. Then import prototype column 2, create a snapshot and so on.
2. If you are experimenting with different raw materials across prototypes, add all possible raw materials to your BOM. When working with prototypes just set the materials you do not want to use to a 0 quantity.
3. You may see inconsistent theoretical calculations between Excel and PLM for Process if:
  - a. Regulatory Breakdowns on the formulation inputs don't equal 100%
  - b. Any overrides have been added to internal outputs
  - c. Any yield adjusters have been applied.

These reports are easily configurable. If you would like to see additional nutrients or extended attributes, see [Chapter 5—Configuration](#) for more details.

### Important Notes:

1. Only a single formulation specification can be exported to a report. If your formulation includes an intermediate formulation you should use the BOM inclusion tool to flatten your formulation hierarchy. You can access the BOM inclusion tool by selecting the following icon  next to the context dropdown.
2. When modifying percentages, we do not normalize percentages in Excel, so if your % Batch does not match 100%, exactly, then your % Batch, nutrient values, moisture, and EA values may be slightly different when pushed back to the formulation specification.

## Chapter 3—Handlers

FlexSync handlers are used to export, format and import data. FlexSync Formulation includes handlers that export key formulation specification information as well key information from the inputs used in the formula. For a full list of exportable data, please refer to [Appendix B—Data Dictionary](#).

## Chapter 4—Installing/Upgrading FlexSync Formulation

Note: FlexSync Formulation goes along with the core release of Oracle Agile PLM for Process v6.2.4.x.

To activate the feature, complete the following steps:

1. Make sure v6.2.4.x deployment is completed.
2. Edit configuration file "\\Config\\Custom\\CustomerSettings.config" and add the entry under node "<FeatureConfig></FeatureConfig>".  
<add key="GSM.FlexSyncFormulation.Enabled" value="true" configDescription="Enables the flexSync formulation feature when configure is true. When it's enabled, Users assigned with role [FRM\_FLEXSYNC] can access the FlexSync output tool for formulation specifications." />
3. Restart RemotingContainer Service.
4. Restart IIS.

### Assigning User Roles

Users must be assigned the new role [FRM\_FLEXSYNC] to access the FlexSync output tool for formulation specifications.

### Template Location

Currently, all report templates are copied to c:\plm4p\Templates\. If this is not the desired location, you will need to update the TemplateLocation field in the flexReports table. Once your DB update is committed, you will need to move your templates to the new location on the file system.

## Chapter 5—Configuration

Report templates can be easily modified to allow for additional nutrients and extended attributes.

**Important Note:** When modifying a report template, ensure the value for 'Already Initialized' is set to 0 on the System worksheet before saving.

### Adding Additional Nutrients

Out of the box the reports display Calories, Fat and Sodium. Additional nutrients can be easily added to any report template using out of the box Nutrient Value functions. Out of the box functions know how to pull nutrient values from the "From PLM4P" sheet by referencing their unique InFoods ID.

### Single Formula Reports

Create 2 new columns on the report template using the NutrientValue() and OracleMultiply() functions.

For example, the business wants to see Carbohydrates represented as a column.

1. Insert 2 new columns or copy an existing nutrient column and nutrient contribution column.
2. Modify the header row of the new nutrient column as 'Carbohydrates'.
3. Modify the header row of the new nutrient contribution column as 'Carbohydrates Contribution'.
4. Assign a formula to the cell on the BOM input row of the 'Carbohydrates' column. The formula will be:  
`=NutrientValue(B5, "CHOCDF", TRUE)`
5. Assign a formula to the cell on the BOM input row of the 'Carbohydrates Contribution' column. The formula will be:  
`=OracleMultiply(NutrientValue(B5, "CHOCDF"), H5*0.01)`
6. Format the cells to be consistent with the grid.
7. Save & Close the report.

### Prototype Experiments Reports

Create a new row on the report template using the GetNutrientTotal() function.

For example, the business wants to see Protein represented in the Key Values grid.

1. Insert a new row or copy an existing nutrient row in the Key Values grid.

*Note: Make sure the PrototypeExperimentsQty.KeyValues.Value named range is not broken by this action*

2. Assign a formula to the cell contained by PrototypeExperimentsQty.KeyValues.Value (Control column). The formula will be:  
`=GetNutrientTotal(PrototypeExperimentsQty.InputKey, PrototypeExperimentsQty.Quantity, PrototypeExperimentsQty.UOM, "PROCNT")`

3. Assign a formula to the cell in each Prototype column. You will have to modify the input range for each column, but the formula for Prototype column 1 will be:  
`=GetNutrientTotal(PrototypeExperimentsQty.InputKey, $G$6, PrototypeExperimentsQty.UOM, "PROCNT")`
4. Format the cells to be consistent with the grid.
5. Save & Close the report.

## Adding Additional Extended Attributes

Out of the box only distinct extended attributes with the “Is Design Attribute” tag are exported. The working sheets display extended attributes with the ID of 15 and 87. These will probably not match extended attributes in your system. You can customize these columns by adjusting the IDs referenced in the functions. You can also add additional extended attributes that you are interested in.

## Single Formula Reports

Create 2 new columns on the report template using the EAValue() and OracleMultiply() functions.

For example, the business wants to see distinct EA with the EA ID of ‘Brix’ represented as a column.

1. Insert 2 new columns or copy an existing EA column and EA contribution column.
2. Modify the header row of the new EA column as ‘Brix’.
3. Modify the header row of the new nutrient contribution column as ‘Brix Contribution’.
4. Assign a formula to the cell on the BOM input row of the ‘Carbohydrates’ column. The formula will be:  
`=EAValue(B5, "Brix", TRUE)`
5. Assign a formula to the cell on the BOM input row of the ‘Carbohydrates Contribution’ column. The formula will be:  
`=OracleMultiply(EAValue(B5, "Brix"), H5*0.01)`
6. Format the cells to be consistent with the grid.
7. Save & Close the report.

## Prototype Experiments Reports

Create a new row on the report template using the GetEATotal() function.

For example, the business wants to see the Distinct Input EA with the EA ID of ‘Brix’

1. Insert a new row or copy an existing EA row in the Key Values grid.

*Note: Make sure the PrototypeExperimentsQty.KeyValues.Value named range is not broken by this action*

2. Assign a formula to the cell contained by PrototypeExperimentsQty.KeyValues.Value (Control column). The formula will be:  
`=GetEATotal(PrototypeExperimentsQty.InputKey, PrototypeExperimentsQty.Quantity, PrototypeExperimentsQty.UOM, "Brix")`



3. Assign a formula to the cell in each Prototype column. You will have to modify the input range for each column, but the formula for Prototype column 1 will be:  
`=GetEATotal(PrototypeExperimentsQty.InputKey, $G$6, PrototypeExperimentsQty.UOM, "Brix")`
4. Format the cells to be consistent with the grid.
5. Save & Close the report.

## Report Navigation

By default reports are added to the action menu and appear when a user is on any formulation specification. However, you have complete control over these links. You can allow users to quickly access the reports by adding action icons to specific reports and the report import action.

## Customizing Reports for Specific Groups

You can do something simple like only show the Single Formula Report Quantity report to users in specific user groups. Or you can do something more complex and create report templates for specific product categories. Where users in the “Beverages” group see a report template that displays Calories, Total Sugars, Vitamin C and Brix extended attribute, while users in the “Sauces” group see Calories, Fat, Sodium and the Acidity extended attribute.

For more information around how to add and adjust navigation see the *Agile Product Lifecycle Management for Process Navigation Configuration Guide*.

## For Performance

To improve performance of the export process, you can remove named ranges deemed unnecessary to the business. These named ranges will then be ignored during the export process. For instance, the out of the box template exports distinct EAs. If you do not need this data, then the section and the corresponding named ranges can be removed from the template. FlexSync checks the report, and if the named range isn't there, it will not waste time gathering this data from the system.

## Trust Relationship

By default, Excel does not automatically enable macros when downloading from an Internet source. In newer versions of Excel, editing is also disabled. For a better user experience, we recommend setting up a trust relationship to eliminate the need to enable editing and enable content every time a report is exported.

## Chapter 6—Creating New Reports

Additional Reports can be created easily by using the out of the box reports as a starting point. For more information around how to set up new reports, including copying of existing reports, see the *Agile Product Lifecycle Management for Process FlexSync Foundation Guide*.

## Appendix A—Oracle Functions

Several out of the box VBA functions are available and can be re-used in custom templates.

	Function
<b>Spec Name</b>	GetSpecName(specId As String, inputId As String, Optional isInput As Boolean = True)
<b>Spec Number</b>	GetSpecNumber(specId As String, inputId As String, Optional isInput As Boolean = True)
<b>Spec Issue</b>	GetSpecIssue(specId As String, inputId As String, Optional isInput As Boolean = True)
<b>Step Number</b>	GetStepNumber(specId As String, inputId As String, Optional isInput As Boolean = True)
<b>Quantity</b>	QuantityValue(inputId As String, Optional treatNullAsEmpty As Boolean = False, Optional isInput As Boolean = True)
<b>UOM</b>	QuantityUOMValue(specId As String, inputId As String)
<b>Total Solids</b>	SolidsValue(inputId As String, Optional treatNullAsEmpty As Boolean = False, Optional isInput As Boolean = True)
<b>Total Moisture</b>	MoistureValue (inputId As String, Optional treatNullAsEmpty As Boolean = False, Optional isInput As Boolean = True)
<b>% Batch</b>	PercentBatchValue(inputId As String, qty As Double, qtyUOM As String, totalQty As Double, Optional totalQtyUOM As String = "")
<b>Base Cost</b>	CostValue(inputId As String, Optional treatNullAsEmpty As Boolean = False)
<b>Nutrient Name</b>	NutrientName(inputId As String, nutrientId As String, Optional isInput As Boolean = True)
<b>Nutrient Value</b>	NutrientValue(inputId As String, nutrientId As String, Optional treatNullAsEmpty As Boolean = False, Optional customNullValue As Variant, Optional isInput As Boolean = True)
<b>Nutrient UOM</b>	NutrientUOMValue(specId As String, inputId As String, Optional isInput As Boolean = True)
<b>Extended Attribute Name</b>	EAName(inputId As String, eald As String, Optional isInput As Boolean = True)
<b>Extended Attribute Value</b>	EAValue(inputId As String, eald As String, Optional treatNullAsEmpty As Boolean = False, Optional customNullValue As Variant, Optional isInput As Boolean = True)
<b>Extended Attribute UOM</b>	EAUOMValue (specId As String, inputId As String, Optional isInput As Boolean = True)
<b>Input Gain/Loss</b>	MaterialGainLossValue(inputId As String, Optional treatNullAsEmpty As Boolean = False, Optional customNullValue As Variant)
<b>Inputs Array</b>	GetInputKeys() As Variant
<b>Outputs Array</b>	GetOutputKeys() As Variant
<b>Input Spec ID</b>	GetInputSpecID(inputId As String) As String
<b>Output Spec ID</b>	GetOutputSpecID(outputId As String) As String
<b>Total Quantity</b>	GetQuantityTotal(rOwner As Range, rQuantity As Range, rUOM As Range, Optional toUOM As String = "")
<b>Total Moisture</b>	GetMoistureTotal(ownerRange As Range, batchRange As Range, uom As Variant, Optional treatNullAsZero As Boolean = True)
<b>Total Nutrient</b>	GetNutrientTotal(ownerRange As Range, batchRange As Range, uom As Variant, nutrientId As String, Optional treatNullAsZero As Boolean = True, Optional customNullValue As Variant)

	Function
<b>Total Extended Attribute</b>	GetEATotal(ownerRange As Range, batchRange As Range, uom As Variant, eald As String, Optional treatNullAsZero As Boolean = True, Optional customNullValue As Variant)
<b>Cost Book Array</b>	GetCostBooks()
<b>Cost Value from Cost Book</b>	CostValueFromLibrary(specId As String, costType As String, costSet As String, Optional treatNullAsEmpty As Boolean = False)
<b>Convert Quantity</b>	UOMConvert(inputId As String, fromValue As Double, fromUOMAbbr As String, Optional toUOMAbbr As String = "", Optional toValue As Double = 1#, Optional treatNullAsZero As Boolean = True)
<b>Preferred Quantity UOM</b>	GetPrefUOM()
<b>Preferred Cost UOM</b>	GetPrefCostUOMUOM()
<b>Preferred Cost Per Value</b>	GetPrefCostUOMValue(Optional treatNullAsEmpty As Boolean = False)
<b>Preferred Cost Currency</b>	GetPrefCostUOMCurrency()
<b>Preferred Cost Type and Set</b>	GetPrefCostTypeAndSet()

## Appendix B—Data Dictionary

The FlexSync Formulation reports export formulation data across many dimensions. The purpose of this appendix is to explain what data is provided and how it is sourced.

### Summary

The Summary section of the export data contains general summary data for the formulation specification.

Spec Name	Specification name
Short Name	The multi-lingual text of the short name
Spec #	The specification number (does not include issue number)
Issue #	The revision number of the specification
Status	Name of the specification's workflow status
Category	Formulation Specification's Category within the Spec Category hierarchy
Sub Category	Formulation Specification's Sub Category within the Spec Category hierarchy
Group	Formulation Specification's Group within the Spec Category hierarchy

### Preferences

The Preferences section of the export data contains settings set directly on the formulation specification.

UOM	Formulation preferred UOM setting
Calc Path	Formulation preferred Calc Path setting
Density Mass UOM	Formulation preferred Calc Path setting
Density Vol UOM	Formulation preferred Calc Path setting
Combine Like Items	Formulation Combine Like Items setting
Set New Outputs As Fixed	Formulation Set New Outputs As Fixed setting
Assign Pack Size	Formulation Assign Pack Size setting
Cross Ref	Formulation preferred Cross Reference setting

Cost UOM Currency	Formulation preferred Cost UOM Currency setting
Cost UOM Value	Formulation preferred Cost UOM Value setting
Cost UOM UOM	Formulation preferred Cost UOM UOM setting
Cost Type	Formulation preferred Cost Type setting
Cost Set	Formulation preferred Cost Set setting

## Cross References

The Cross References section of the export data is a collection representing the Cross References directly associated with the formulation specification.

Key	The unique id (pkid) of the cross reference
System Name	The external system name (e.g. JDE, SAP, etc.)
System ID	The external system code (e.g. USBPCS, USSAP, etc.)
Equivalent	The actual external system identifier value
Status	Name of the cross reference's status

## Steps

The Steps section of the export data is a collection representing the formulation steps.

Key	The unique id (pkid) of the formulation step
Step #	The conceptual processing flow order of the steps
Step Name	The given user or generated name of this step
Step Instructions	Instructions associated with the step

## Simple EAs

The Simple EAs section of the export data is a collection representing extended attributes attached directly to the formulation specification.

Key	The unique id (pkid) of the extended attribute instance
-----	---

EA Name	The name of the extended attribute type
EA ID	Unique ID for attribute
EA Value	EA value associated with the formulation specification
EA UOM	UOM for the EA Value
Notes	Comments associated with the extended attribute type

## BOM Inputs

The BOM Inputs section of the export data is a collection representing the formulation's material specification inputs.

Key	The unique id (pkid) of the input
Spec PKID	The unique id (pkid) of the material specification
Line Order	Unique sequential number for the input
Step #	Step number the input is associated with
Spec Number	The material specification number (does not include issue number)
Spec Issue	The revision number of the material specification
Name	Name of the material specification
Comment	Comment associated with the input
% batch	Percent of the batch size
Quantity	Input Quantity
UOM	Quantity UOM
Base Qty(g)	Quantity in grams
Base Qty (ml)	Quantity in milliliters
G/L	Gain Loss associated with the input
Yield	Input Yield
Yield UOM	Input Yield UOM

USD/100g	Input cost in US Dollars per 100g
Ext Cost	External Cost
Volume	Input Volume
Volume UOM	Volume UOM
Volume in Base UOM (ml)	Volume converted to milliliters
Mass	Input Mass
Mass UOM	Mass UOM
Mass in Base UOM (g)	Mass in grams
Total Solids	Total solids

### Consume from Step

The Consume From Step section of the export data is a collection representing the formulation's inputs that are consumed from other steps.

Key	The unique id (pkid) of the input
Spec PKID	The unique id (pkid) of the material specification
Line Order	Unique sequential number for the input
Step #	Step number the input is associated with
Spec Number	The material specification number (does not include issue number)
Spec Issue	The revision number of the material specification
Name	Name of the material specification
Comment	Comment associated with the input
% batch	Percent of the batch size
Quantity	Input Quantity
UOM	Quantity UOM
Base Qty(g)	Quantity in grams



Base Qty (ml)	Quantity in milliliters
G/L	Gain Loss associated with the input
Yield	Input Yield
Yield UOM	Input Yield UOM
USD/100g	Input cost in US Dollars per 100g
Ext Cost	External Cost
Volume	Input Volume
Volume UOM	Volume UOM
Volume in Base UOM (ml)	Volume converted to milliliters
Mass	Input Mass
Mass UOM	Mass UOM
Mass in Base UOM (g)	Mass in grams
Total Solids	Total solids

## BOM Outputs

The BOM Outputs section of the export data is a collection representing all the formulation's outputs, regardless of type.

Key	The unique id (pkid) of the output
Spec PKID	The unique id (pkid) of the material specification
Line Order	Unique sequential number for the input
Output of Step #	Step number the output is associated with
Input to Step #	Step number of the input that consumes this output
Number	The material specification number (does not include issue number).
Spec Issue	The revision number of the material specification
Name	Name of the material specification

Quantity	Input Quantity
Quantity UOM	Quantity UOM
Base Qty(g)	Quantity in grams
Base Qty (ml)	Quantity in milliliters
Process G/L	Process Gain Loss associated with the output
Water G/L	Output's water gain/loss
Yld	Input Yield
Yld UOM	Input Yield UOM
Output Type	Output Type
Product Type	Product Type
Volume	Output Volume
Volume UOM	Volume UOM
Volume in Base UOM (ml)	Volume converted to milliliters
Mass	Output Mass
Mass UOM	Mass UOM
Mass in Base UOM (g)	Mass in grams
Total Solids	Total solids

## Formulation Tags

The Formulation Tags section of the export data is a collection representing the tags associated with the formulation specification's inputs.

Key	Combination of the input pkid and the tag pkid
Owner	The unique id (pkid) of the input
Tag PKID	The unique id (pkid) of the tag
Tag Name	The name of the tag

Behavior ID	The behavior ID of the tag
-------------	----------------------------

### Cross References – Inputs

The Input Cross Reference section of the export data is a collection of cross references associated with the formulation's inputs.

Key	Combination of the cross ref pkid and input pkid
Spec Pkid	The unique id (pkid) of the input
System Name	The external system name (e.g. JDE, SAP, etc.)
System ID	The external system code (e.g. USBPCS, USSAP, etc.)
Equivalent	The actual external system identifier value
Status	Name of the cross reference's status
Description	Cross Reference description
UOMs	separated list of UOMs associated with the cross reference

### Cross References – Outputs

The Input Cross Reference section of the export data is a collection of cross references associated with all the formulation's outputs.

Key	Combination of the cross ref pkid and input pkid
Spec Pkid	The unique id (pkid) of the input
System Name	The external system name (e.g. JDE, SAP, etc.)
System ID	The external system code (e.g. USBPCS, USSAP, etc.)
Equivalent	The actual external system identifier value
Status	Name of the cross reference's status
Description	Cross Reference description
UOMs	separated list of UOMs associated with the cross reference

## Extended Attributes– Inputs

The Extended Attributes Inputs section of the export data is a collection of extended attributes associated with the formulation’s material inputs. These extended attributes must be distinct and have the “Is Design Attribute” tag.

Key	The unique id (pkid) of the extended attribute instance combined with the input pkid
Owner	The unique id (pkid) of the input
EA Name	The name of the extended attribute type
EA ID	Unique ID for attribute
EA Value	EA value associated with the formulation specification
EA UOM	UOM for the EA Value
Notes	Comments associated with the extended attribute type

## Extended Attributes – Outputs

The Extended Attributes Inputs section of the export data is a collection of extended attributes associated with the formulation’s outputs. In the case of referenced material outputs, the EAs are pulled from the material specification. With all other outputs, the EAs are pulled from the output’s theoretical EAs while taking overrides into account. These extended attributes must be distinct and have the “Is Design Attribute” tag.

Key	The unique id (pkid) of the extended attribute instance combined with the input pkid
Owner	The unique id (pkid) of the input
EA Name	The name of the extended attribute type
EA ID	Unique ID for attribute
EA Value	EA value associated with the formulation specification
EA UOM	UOM for the EA Value
Notes	Comments associated with the extended attribute type

## Nutrients – Inputs

The Nutrients Inputs section of the export data is a collection of nutrients associated with the formulation's inputs.

Key	The unique id (pkid) of the nutrient combined with the input pkid
Owner	The unique id (pkid) of the input
Nutrient ID	Nutrient InFoodsID
Nutrient Name	Nutrient Name
Nutrient Value	Nutrient value for this input
Nutrient Value UOM	UOM for the Nutrient Value

## Nutrients – Outputs

The Nutrients Outputs section of the export data is a collection of nutrients associated with the formulation's outputs.

Key	The unique id (pkid) of the nutrient combined with the output pkid
Owner	The unique id (pkid) of the output
Nutrient ID	Nutrient InFoodsID
Nutrient Name	Nutrient Name
Nutrient Value	Nutrient value for this input
Nutrient Value UOM	UOM for the Nutrient Value

## Costs – Inputs

The Costs Inputs section of the export data is a collection of costs associated with each input material's cross references.

Key	Combination of the input pkid and the cost item pkid
Spec Pkid	The unique id (pkid) of the input material
Equivalent Key	The unique id (pkid) of the cross reference equivalent
Facility Name	The name of the cost item facility

Cost Type	The cost item's cost type
UOM	UOM associated with the cost item
Currency	Currency the cost is reported in
Cost	The actual cost item cost

### Costs – Outputs

The Costs Outputs section of the export data is a collection of costs associated with each output material's cross references.

Key	Combination of the output pkid and the cost item pkid
Spec Pkid	The unique id (pkid) of the output material
Equivalent Key	The unique id (pkid) of the cross reference equivalent
Facility Name	The name of the cost item facility
Cost Type	The cost item's cost type
UOM	UOM associated with the cost item
Currency	Currency the cost is reported in
Cost	The actual cost item cost