



# eQube®-CLM Solutions

# Windchill to Solumina Sync Solution based on eQube®-MI

Version 1.2

User Guide

## Restricted Rights

# Table of Contents

# 1. Introduction

The purpose of this document is to help users to get started with eQ Technologic Inc.'s Windchill to Solumina Sync solution based on eQube®-MI 6.1.2. This document contains the APIs, supported touchpoints, and sample inputs to trigger the sync actions. It also provides steps to configure the solution for your environment.

The Windchill to Solumina Sync solution is built using the OOTB data model of Windchill and Solumina. It uses eQ's Windchill and Solumina connectors for connectivity and for fetching/creating/updating/relating the data.

eQ's Windchill connector uses the Windchill Info Engine APIs and the Solumina JMS for synchronization.

The solution is developed and certified on eQube®-MI 6.1.2.

## 1.1. Prerequisites

Before using the Windchill to Solumina Sync solution, ensure that:

1) eQube®-MI 6.1.2 and eQube®-AG 6.1.2 (API Gateway) are deployed and running.
2) Appropriate eQube®-MI 6.1.2 license is procured and deployed.
3) Deployment steps for Windchill to Solumina Sync solution are followed and required properties (from properties files and eQube®-MI 6.1.2 user-defined properties) have been modified.
4) Necessary Windchill workflows are created for triggering the APIs.

## 1.2. Scope

The Windchill to Solumina Sync solution covers the synchronization based on events such as object releasing in Windchill.

The following touchpoints are covered as a part of v1.2–

1) Engineering Change Notice
2) Part
3) Catalog Notify
4) BOM
5) Tooling
6) Process Plan
7) Standard Operation

## 1.3. Document references

| Document # | Name | Revision # | Shared By |
|---|---|---|---|
| 1. | PLM Connector [ECN].pdf | | iBASE-t |

| | | | |
|---|---|---|---|
| 2. | PLM Connector [Part].pdf | | iBASE-t |
| 3. | PLM Connector [Catalog Notify].pdf | | iBASE-t |
| 4. | PLM Connector [Bills Of Material].pdf | | iBASE-t |
| 5. | PLM Connector [Tool].pdf | | iBASE-t |
| 6. | PLM Connector [Process Plan].pdf | | iBASE-t |
| 7. | PLM Connector [Standard Operation].pdf | | iBASE-t |

## 1.4. Definitions and acronyms

| Sr # | Nomenclature/Abbreviations | Description |
|---|---|---|
| 1. | WC | Windchill |
| 2. | SOL | Solumina |
| 3. | MI | eQube® MI |
| 4. | AG | eQube® API Gateway |
| 5. | ECN | Engineering Change Notice |
| 6. | ECR | Engineering Change Request |
| 7. | BOM | Bill Of Material |

# 2. Sync solution touchpoints

The Windchill to Solumina Sync solution comprises 1 REST API which supports 7 touchpoints.

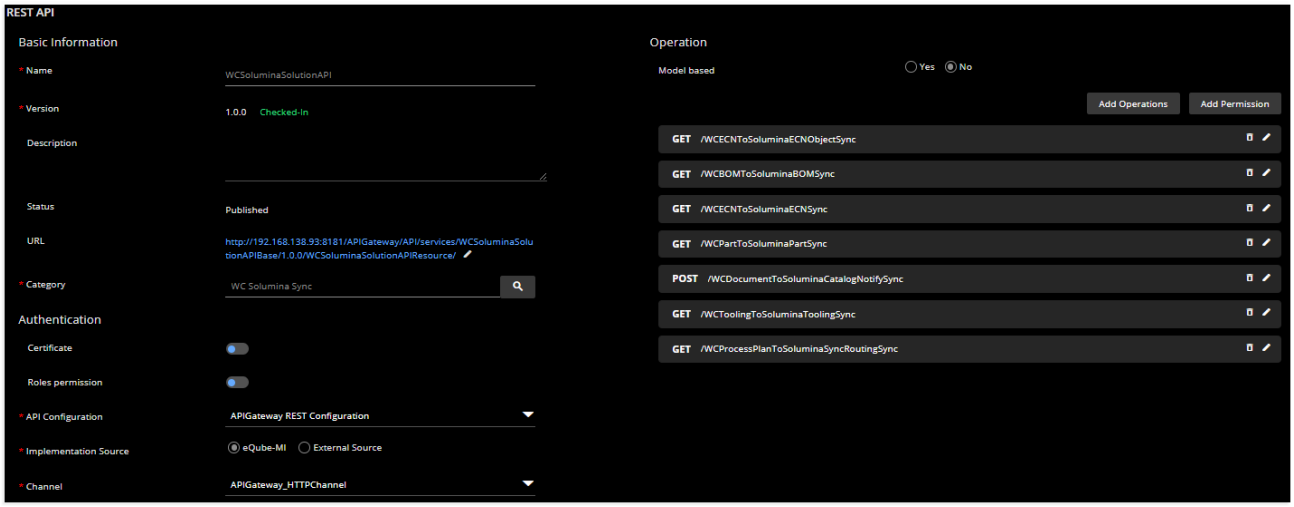
Note: Each operation accepts only a single input. For example, Part syncs only a single Part

## 2.1. API – WCSoluminaSolutionAPI

This API supports the touchpoints required for the synchronization of applicable Windchill data to Solumina. All touchpoints from this API are supported for the URL-based invocation from entities such as Windchill workflows.

The solution API package the contains additional documentation for reference as below:

1. Swagger JSON for API
2. WADL set for API
3. Readme




The sub-sections below provide details of the touchpoints-

### 2.1.1. Touchpoint – WCECNToSoluminaECNSync

This touchpoint helps synchronize released ECN and its related objects as given below –

| # | Windchill Object | Solumina Object | Comments |
|---|---|---|---|
| 1 | ECN | ECN | |
| 2 | Parts | Parts | |
| 3 | BOM | BOM | |
| 4 | Process Plan | Sync Routing | |
| 6 | Tooling | Tooling | |
| 7 | Documents | Catalog Notify | Physical File |

| | | | |
|---|---|---|---|
| 8 | EPMDocument | Catalog Notify | Physical File |

Input:

| Parameter | Comment |
|---|---|
| UFID | Windchill Change Notice UFID |
| Source_Connection_Id | Windchill Connection ID from eQube®-MI 6.1 |
| Destination_Connection_Id | Solumina Connection ID from eQube®-MI 6.1 |
| revisionRule | It uses saved filter of Windchill to expand BOM |
| persist_data | Enable/disable digital persistence |

Details: This interface synchronizes the engineering change notice (ECN) and its affected/resulting objects from Windchill to Solumina.

Along with the ECN, this interface synchronizes the associated affected and resulting objects such as Part, BOM , Tooling, Document, EPMDocument, and ProcessPlan from Windchill to Solumina and relates them. Windchill ECR attributes are synchronized to Solumina's ECN object. While synchronizing ECN and its affected and resulting objects, this interface saves the basic information like ID, name, revision, creation date, etc. of Windchill and Solumina objects in the associated Graph database with downstream and upstream relations. This information is used to search/identify objects in the source systems.

### 2.1.2. Touchpoint – WCECNToSoluminaECNObjectSync

This touchpoint helps synchronize released ECN Object as given below –

| # | Windchill Object | Solumina Object | Comments |
|---|---|---|---|
| 1 | ECN | ECN | |

Input:

| Parameter | Comment |
|---|---|
| UFID | Windchill Change Notice UFID |
| Source_Connection_Id | Windchill Connection ID from eQube®-MI 6.1 |
| Destination_Connection_Id | Solumina Connection ID from eQube®-MI 6.1 |
| persist_data | Enable/disable digital persistence |

Details: This interface synchronizes the engineering change notice from Windchill to Solumina.

This interface synchronizes Windchill's change notice and change request’s attributes with Solumina. While synchronizing, this interface saves the basic information like ID,

name, revision, creation date, etc. of Windchill and Solumina objects in the associated Graph database with downstream and upstream relations. This information is used to search/identify objects in the source systems.

### 2.1.3. Touchpoint – WCPartToSoluminaPartSync

This touchpoint helps synchronize released Part and its related objects as given below –

| # | Windchill Object | Solumina Object | Comments |
|---|---|---|---|
| 1 | Part | Part | |
| 2 | BOM | BOM | |
| 3 | Documents | Catalog Notify | Physical File |
| 4 | EPMDocument | Catalog Notify | Physical File |
| 5 | Representation/Annotation | Catalog Notify | URL |

Input:

| Parameter | Comment |
|---|---|
| UFID | Windchill Part UFID |
| Source_Connection_Id | Windchill Connection ID from eQube®-MI 6.1 |
| Destination_Connection_Id | Solumina Connection ID from eQube®-MI 6.1 |
| revisionRule | It uses saved filter of windchill to expand BOM |
| persist_data | Enable/disable digital persistence |

Details: This interface synchronizes the Part from Windchill to Solumina.

Along with the Part, this interface syncs the associated BOM, Documents and Alternate Parts from Windchill to Solumina. It calls respective BOM, Part and Document interfaces for associated objects. The documents are related to Part with Described By, Reference and CAD/Dynamic relations are synchronized. The Representation/Annotations are also synchronized of the Part as URI to Solumina. While synchronizing Parts, associated Documents and Alternate Parts, this interface saves the basic information like ID, name, revision, creation date, etc. of Windchill and Solumina objects in the associated Graph database with downstream and upstream relations. This information is used to search/identify objects in the source systems.

### 2.1.4. Touchpoint – WCDocumentToSoluminaCatalogNotifySync

This touchpoint helps synchronize released Document object as given below –

| # | Windchill Object | Solumina Object | Comments |
|---|---|---|---|
| 1 | Documents | Catalog Notify | Physical File |
| 2 | EPMDocument | Catalog Notify | Physical File |
| 3 | Representation/Annotation | Catalog Notify | URL |

**Details:** This interface synchronizes Document, EPMDocument, Representation/Annotation URI from Windchill to Solumina.

For Windchill Document and EPMDocument object types, the associated files are downloaded, and they are physically attached to the CatalogNotify in Solumina. For Representation/Annotations, physical files are not moved to Solumina. Instead of the physical file, Windchill's URL is attached to Catalog Notify in Solumina. If the Parent Object's details are provided in the input, this interface also relates Catalog Notify to its Parent Object in Solumina. While synchronizing Document and/or it's related Parent Object, this interface saves the basic information like ID, name, revision, creation date, etc. of Windchill and Solumina objects in the associated Graph database with downstream and upstream relations. This information is used to search/identify objects in the source systems.

### 2.1.5. Touchpoint – WCBOMToSoluminaBOMSync

This touchpoint helps synchronize released BOM as given below –

| # | Windchill Object | Solumina Object | Comments |
|---|---|---|---|
| 1 | BOM | BOM | |

Input:

| Parameter | Comment |
|---|---|
| UFID | Windchill Part UFID |
| Source_Connection_Id | Windchill Connection ID from eQube®-MI 6.1 |
| Destination_Connection_Id | Solumina Connection ID from eQube®-MI 6.1 |
| revisionRule | It uses saved filter of windchill to expand BOM |
| depth | Expand multilevel bom upto n-depth |

**Details:** This interface synchronizes BOM from Windchill to Solumina.

Along with BOM, this interface synchronizes the associated Part Configurations from Windchill to Solumina. This interface will only consider parts that have an effectivity assigned to them. If multiple effectivities are attached, it considers the latest one. This interface will also attach Alternates and Part Configurations to the parts in the BOM. The interface uses a default depth value of 5, if no depth value is provided.

### 2.1.6. Touchpoint – WCToolingToSoluminaToolingSync

This touchpoint helps synchronize released Tool and related objects as given below –

| # | Windchill Object | Solumina Object | Comments |
|---|---|---|---|
| 1 | Tool | Part | |
| 2 | Documents | Catalog Notify | Physical File |
| 3 | EPMDocument | Catalog Notify | Physical File |
| 4 | Representation/Annotation | Catalog Notify | URL |

Input:

| Parameter | Comment |
|---|---|
| UFID | Windchill Tooling UFID |
| Source_Connection_Id | Windchill Connection ID from eQube®-MI 6.1 |
| Destination_Connection_Id | Solumina Connection ID from eQube®-MI 6.1 |
| persist_data | Enable/disable digital persistence |

Details: This interface synchronizes Tooling from Windchill to Solumina.

Along with Tooling, this interface synchronizes the associated Documents from Windchill to Solumina. The Documents related with Tooling using Described By, Reference and CAD/Dynamic relations are synchronized. Representation/Annotations are also synchronized for the Tooling as URL to Solumina. While synchronizing Tooling and its Documents, this interface saves the basic information like ID, Name, Revision, creation date, etc. of Windchill and Solumina objects in the associated Graph database with downstream and upstream relations. This information is used to search/identify objects in the source systems.

### 2.1.7. Touchpoint – WCProcessPlanToSoluminaSyncRoutingSync

This touchpoint helps synchronize released Process Plan and related objects as given below –

| # | Windchill Object | Solumina Object | Comments |
|---|---|---|---|
| 1 | Process Plan | Sync Routing | |
| 2 | Documents | Catalog Notify | Physical File |
| 3 | EPMDocument | Catalog Notify | Physical File |
| 4 | Representation/Annotation | Catalog Notify | URL |
| 5 | Tool | Tool | |
| 6 | Part | Part | |
| 7 | Operation | Operation | |
| 8 | Operation | Step | |

Input:

| Parameter | Comment |
|---|---|
| UFID | Windchill ProcessPlan UFID |
| Source_Connection_Id | Windchill Connection ID from eQube®-MI 6.1 |
| Destination_Connection_Id | Solumina Connection ID from eQube®-MI 6.1 |
| persist_data | Enable/disable digital persistence |

**Details:** This interface synchronizes ProcessPlan from Windchill to Solumina.

Along with Process Plan, this interface synchronizes associated next-level Operation as Operation, second-level Operation as Step, all associated Parts, Tools, Documents, Location/Department/Workcenter as Site from Windchill to Solumina. The documents related with Process Plan/Operations using Described By, Reference and CAD/Dynamic relations are synced. Representation/Annotations are also synced for the Process Plan as a URI to Solumina. While synchronizing Process Plan and its associated Operations, Parts, Tools, Documents, this interface saves the basic information like ID, Name, Revision, creation date, etc. of Windchill and Solumina objects in the associated Graph database with downstream and upstream relations. This information is used to search/identify objects in the source systems.

## 2.2. API Executions

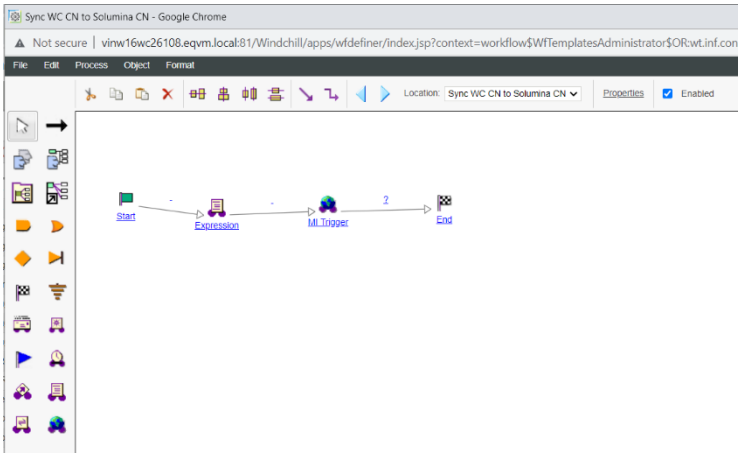
The APIs can be executed/triggered in the following ways:

1. Windchill workflow
2. Postman
3. eQube®-AG 6.1.2.

### 2.2.1. Windchill Workflow

Windchill workflows can be configured to invoke eQube®-MI 6.1 APIs.
For example, the below steps can be followed to configure the Windchill workflow for triggering WCSoluminaSolutionAPI API's "WCECNToSoluminaECNSync" operation-

1. In Windchill Client, go to Site -> Utilities -> Workflow Template Administration.
2. Click **New Template** and create the workflow as follows:




Use the following code snippet for the Expression:

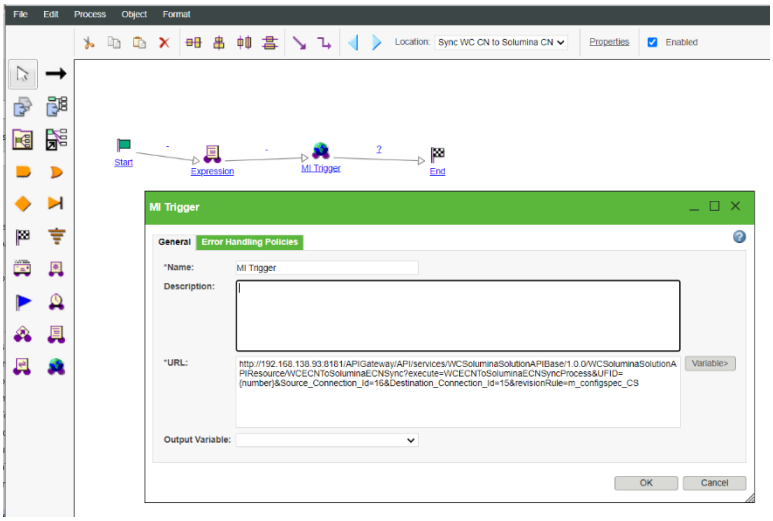
```
wt.fc.Persistable pbo = (wt.fc.Persistable)primaryBusinessObject;

if(pbo instanceof wt.epm.EPMDocument){
   wt.epm.EPMDocument doc = (wt.epm.EPMDocument)pbo;
   number = doc.getNumber();
   rev = doc.getIterationIdentifier().getValue();
ufid = wt.federation.FederationUtilities.getUfid(doc);
}else if(pbo instanceof wt.part.WTPart){
   wt.part.WTPart part = (wt.part.WTPart)pbo;
   number = part.getNumber();
   rev = part.getIterationIdentifier().getValue();
ufid = wt.federation.FederationUtilities.getUfid(part);
}else if(pbo instanceof wt.change2.WTChangeOrder2){
   wt.change2.WTChangeOrder2 cn = (wt.change2.WTChangeOrder2)pbo;
   ufid = wt.federation.FederationUtilities.getUfid(cn);
}
```

Provide eQube-MI API URL in the MI Trigger as follows:

<eQube-AG Context>
/API/services/WCSAPSolutionAPIBase/1.0.0/WCSAPSolutionAPIResource/WCPartToSAP
MaterialSync?object_unique_identifier=%5B%27%7Bufid%7D%27%5D&Source_Connect
ion_Id=<Windchill ConnID>&Destination_Connection_Id=<SAP ConnID>

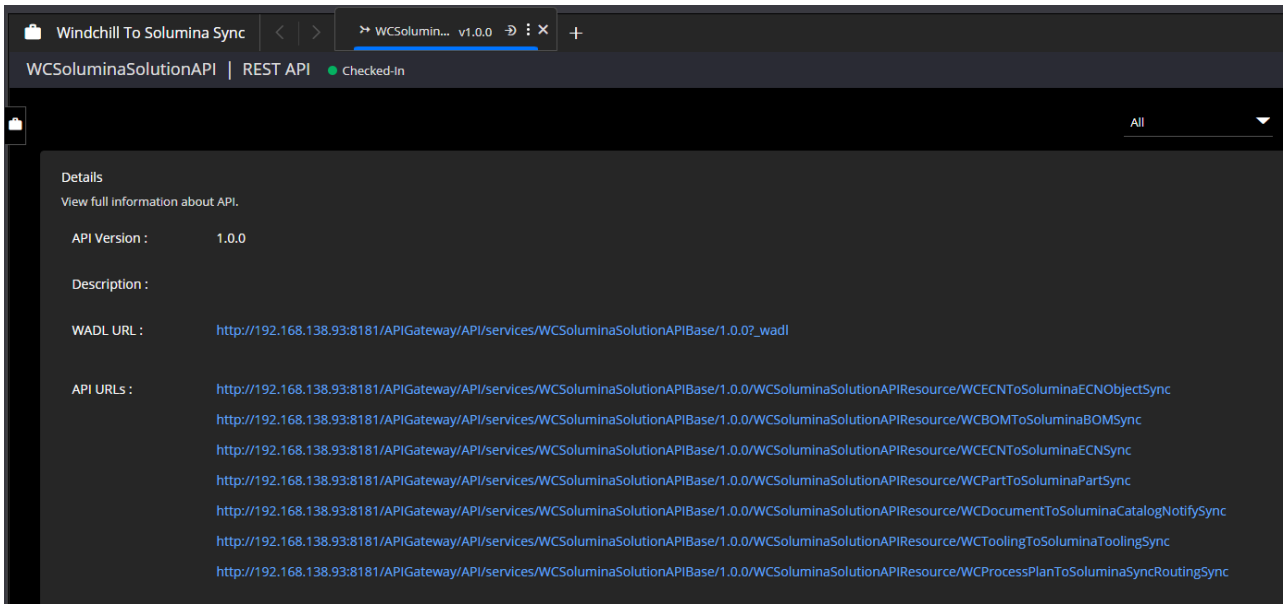
3. Pass the query string parameters such as UFID, Source Connection ID, Destination Connection ID, etc.



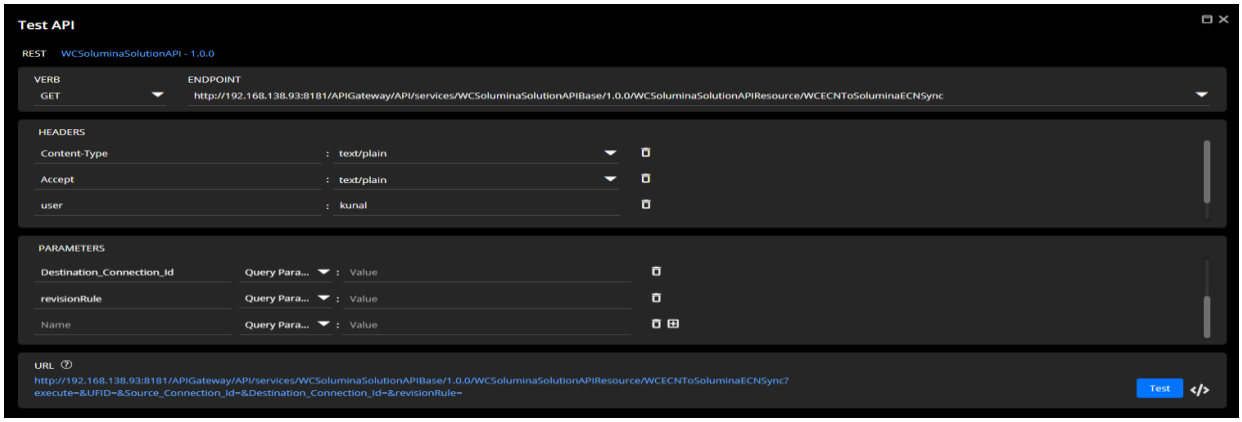

### 2.2.2. Postman API Testing Tool

The steps to configure postman to trigger WCSoluminaSolutionAPI API's "WCECNToSoluminaECNSync" operation are:

1. Open 'WCSoluminaSolutionAPI' and click any of the URL from the **API URLs** section.
2. Copy the URL from the URL section:

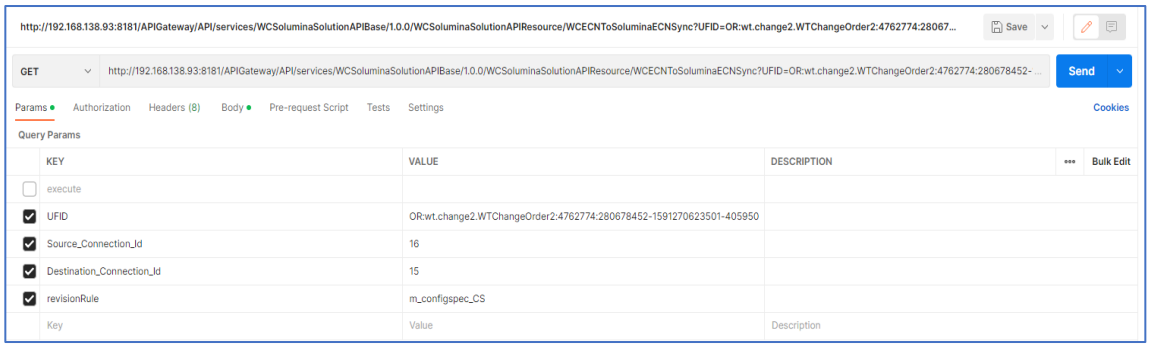



3. Open Postman. Paste the URL and fill required values as shown in the screenshot below.

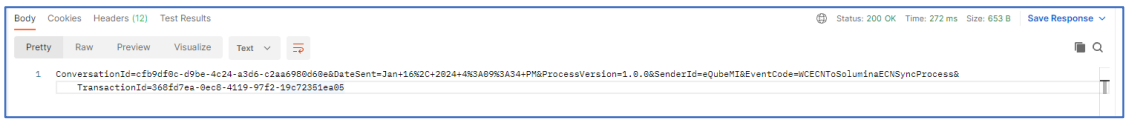



4. For UFID:

WC's ECN UFID array is as show below:
["OR:wt.change2.WTChangeOrder2:4762774:280678452-1591270623501-405950359-108-26-168-192@vinw16wc26108.eqvm.local"]
User must replace square brackets like this:
"OR:wt.change2.WTChangeOrder2:4762774:280678452-1591270623501-405950359-108-26-168-192@vinw16wc26108.eqvm.local"



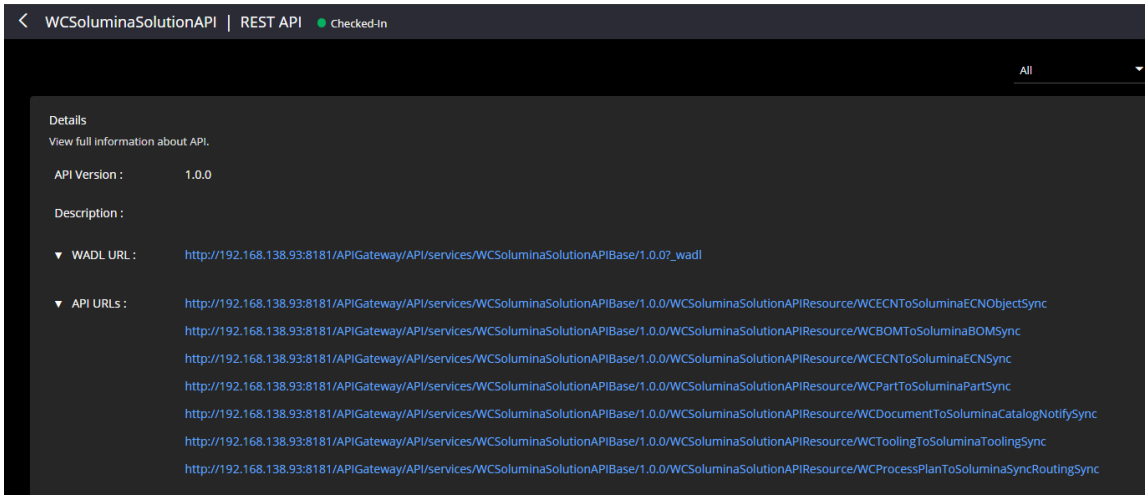

5. Click **Send**.



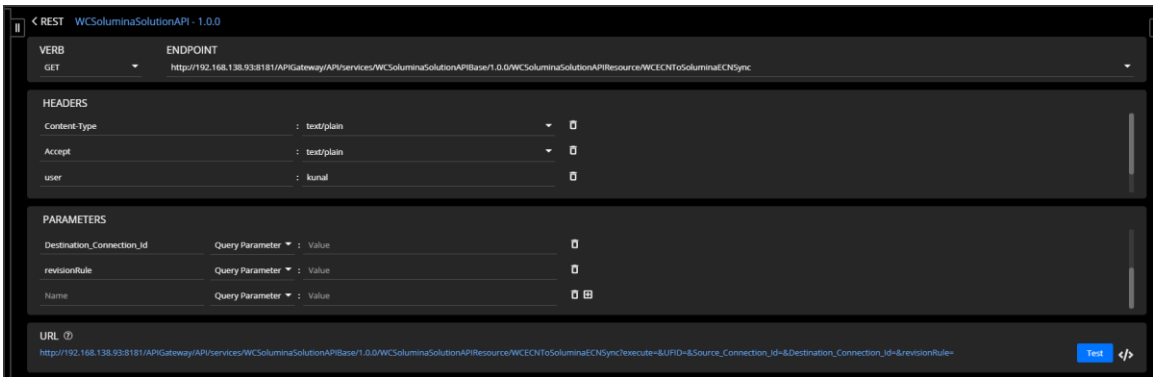

### 2.2.3. Using eQube®-AG 6.1.2

The steps to trigger WCSAPSolutionAPI API's "WCECNToSoluminaECNSync" operation are:

1. Open 'WCSAPSolutionAPI' from eQube®-AG 6.1.2.




2. Select the required URL and fill the required value in parameters as shown below.




3. Click **Test**.

# 3. Exception Handling:

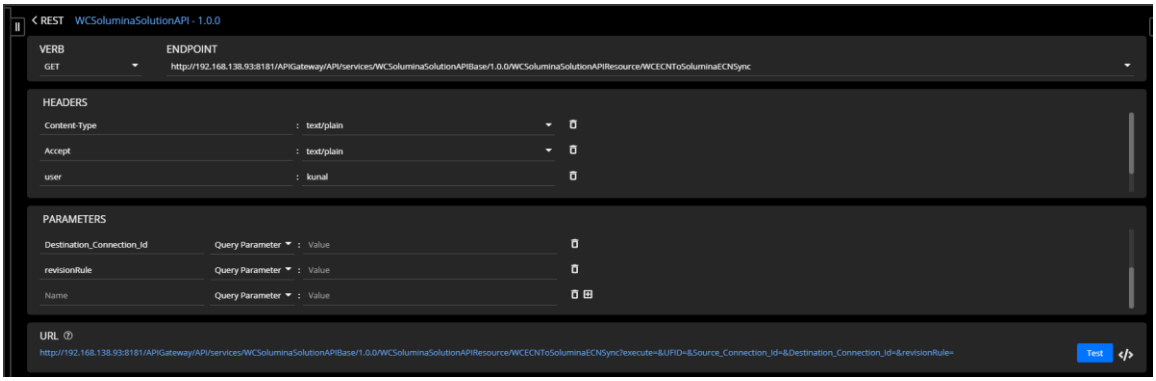
## 3.1. Troubleshooting

### 3.1.1. Insufficient Input Data] Mandatory parameters are missing in the input payload.

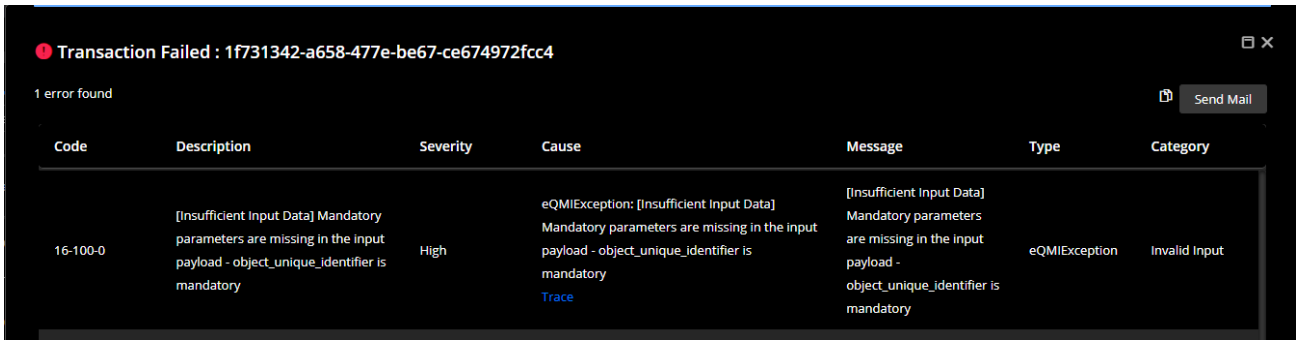
**Error_Code**: OOTB-API-ERR-001

**Error_Description:** [Insufficient Input Data] Mandatory parameters are missing in the input payload.

**Reason**: Attributes which are mandatory for the read or write operation are either missing in the input or a blank value (“”) is passed for those attributes.

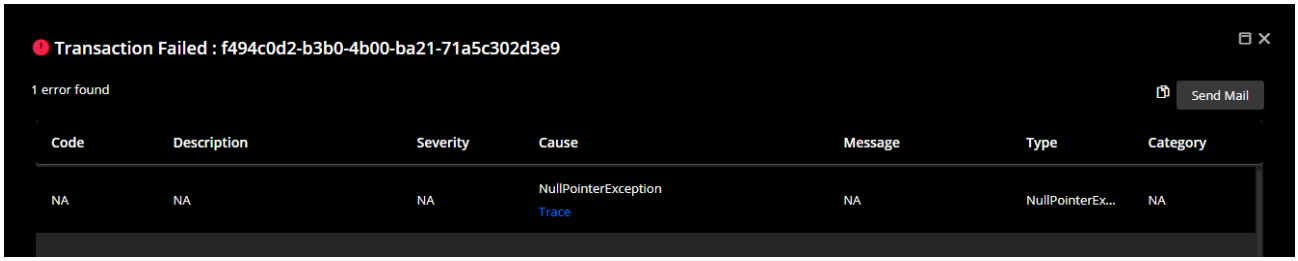



**Resolution**: Mandatory attributes should be present in the input with correct values. To get the list of mandatory attributes, refer to the API in the respective system’s user guide.




### 3.1.2. Null Error

“Null” error occurs for multiple issues which are mentioned below.



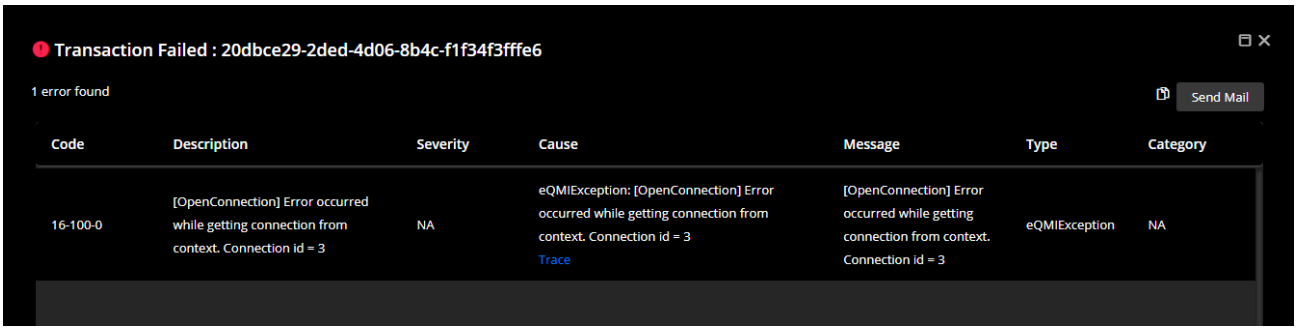

#### 3.1.2.1 Wrong connection ID passed in input.

**Error_Description**: null.
**Reason**: Incorrect value passed for conn_id attribute.
**Resolution**: Correct connection ID should be passed in the input payload.

#### 3.1.2.2 Connection ID not passed in input.

Error_Description: null.
Reason: conn_id attribute does not present in the input payload.
Resolution: Connection ID should be passed in the input payload with correct value.

### 3.1.3. [OpenConnection] Error occurred while getting connection from the context.




**Error_Description**: [OpenConnection] Error occurred while getting a connection from the context. Connection id = 3

Possible Reasons:

1. Application connection is suspended in the application's connection pool.
2. The application server is inactive, and eQube-MI cannot connect with the respective application.

Possible Resolutions:

1. Activate the connection pool for respective application connection by logging into eQube-MI Admin Console.
2. Make the application active and refresh the connection model of the respective connection in eQube-MI Admin Console's Application Connections page.

## 3.2. Re-triggering of transactions

Each sync transaction sends an email with success and failure object details.

3.2.1 Success Email:

Hello,

Below is the summary of the transaction [**7d79ac3e-2fb8-4c2f-9756-c526ce0f18c7**] having a status [**SUCCESS**] -

The following is a list of processed object Ids - [ECN, [[Part, 0000009961A, 0000009962A_0000009961A], [[CatalogNotify]], [BOM, 0000009964A, 7, 0000009961A, 4, A0000009961]], [[Part, 0000009961B, 0000009962A_0000009961B], [[CatalogNotify]], [BOM]], [[Tooling, 0000009963A], [[CatalogNotify, 0000003482A, ECNDoc2.txt], [CatalogNotify, 0000003481A, ECNDoc1.txt], [CatalogNotify, 0000009963_5696189A, 01-5121541b_prt.SRC_EDIT, 01-5121541b_prt.VIEW, 01-5121541b_prt.jpg]]], [ECNObject, MPMTooling0000009963A, 01181, WTPart0000009961A, WTPart0000009961B]]

Thank you.
------END OF EMAIL------

3.2.2 Failure email:

- If any of the transactions fails, the failure email is sent by the eQube-MI to the admins.
- Search for transaction ID from the email (In our case, transaction ID: 10916d1b-c4db-425e-bc78-ca30bcb41b21)

Hello,

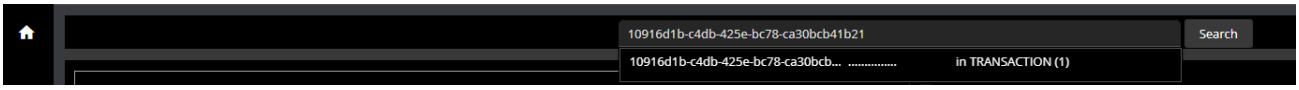
Below is the summary of the transaction [**10916d1b-c4db-425e-bc78-ca30bcb41b21**] having a status [**ERROR**] -

The following is a list of processed object Ids - [ECN, [CatalogNotify], [[SyncRouting], [[CatalogNotify], [CatalogNotify], [CatalogNotify], CatalogNotify]], [ECNObject]]

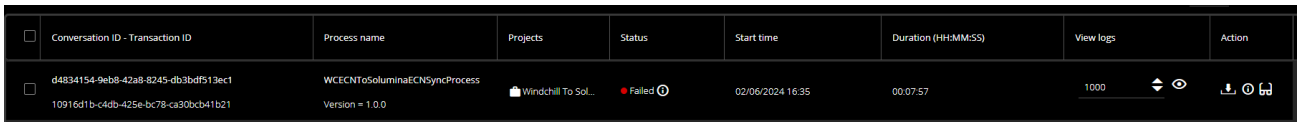
To retry the failed transaction, please click the following URL - Retry Transaction

Thank you.
------END OF EMAIL------

- Open MI, click on search icon, paste the transaction ID in search bar and click on transaction found in search.



- Click on “i” button (In Status Column, near “Failed”).




- One pop-up will appear, read the error and fix it on the source system.(for example  Refer Section 3 Troubleshooting)

- Re-trigger the failed transaction by clicking on “Retry Transaction” in the email.

# About eQ Technologic

eQ Technologic, Inc. ('eQ') is a trusted provider of comprehensive software solutions for enterprise application integration, synchronization, migration, and enterprise-wide visibility. eQ steps in with its flagship product platform, eQube®-DaaS, to rapidly deliver simple solutions for complex data integration & analytics problems!
The Low/No-Code eQube®-DaaS Platform establishes a Data Fabric with connected network of integrated data, applications, and devices that puts the power of analytics in the hands of end users, leading to Actionable Insight. eQ/s 80+ OOTB Connectors help in connecting heterogeneous systems in an instant!
eQ works closely with its customers enabling them to accelerate their digital transformation journey. eQ delivers compelling business outcomes and offers solutions such as: digital thread, CLM (Closed Loop Manufacturing), multi-PLM environment, API factory with CDM (common data model), for-purpose apps, secure collaboration, business process orchestration, & enterprise-wide visibility, to name a few.
Over the past 22 years, eQ has been instrumental in creating game changing solutions for large enterprises and government agencies across industries such as Aerospace & Defense, DOD (Department of Defense), Auto & Machinery, High-Tech, Manufacturing, Energy, Electronics, Consumer Packaged Goods (CPG), Food & Beverage (FMCG), and more. Some of eQ's key customers include Lockheed Martin, Northrop Grumman, US Navy (NAVSEA &NAVAIR), Rolls-Royce, Siemens AG, Siemens Energy, Adient, ULA (United Launch Alliance), Moog, Micron Technologies, Dyson, Visteon, Yanfeng, BAE Systems (MAI & Marine), Boeing, L-3 (multiple divisions), General Electric (multiple divisions), EDF (Nuclear power plants), and General Dynamics (multiple divisions) among many others.

# About eQube®

eQube®-DaaS, is a powerful Low/No-Code Data Integration and Analytics Platform. It rapidly establishes a robust, resilient, and scalable Data Fabric connecting disparate data sources across the enterprise leading to enterprise-wide visibility which empowers organizations with Actionable Insight.
The next-gen hybrid platform consists of two suites of products; the Integration Suite and the Analytics Suite.

# eQube® Integration Suite

The eQube Integration Suite enables customers to seamlessly connect, integrate and migrate data with a comprehensive and efficient infrastructure for Common Data Model (CDM), APIs, enterprise application integration, federation, orchestration, synchronization, and data migration. It provides rapid enterprise-wide integration of new and existing systems, as well as enables responsible and controlled sunsetting of obsolete legacy systems through efficient migration capabilities. It includes eQube®-MI (for data integration and data migration), eQube®-AG (for application integration and API gateway) and eQube®-TM (for data model management and data transformation maps).

# eQube® Analytics Suite

The eQube Analytics Suite empowers you with powerful capabilities to leverage enterprise-wide data on demand by helping you connect, clean, and prepare data, create models, run analytics, and represent data with stunning visualizations for actionable insights. It allows users to build, schedule and monitor fully customizable and configurable dashboards offering near real-time enterprise-wide insights. It consists of eQube®-BI (Business Intelligence) that democratizes BI, eQube®-ADA (Augmented Data Analytics) for data discovery and eQube®-DP (Data Profiler) for data quality assessment. It empowers you to work with any data, any format, any API, any speed, with any system, any application, and any device. All this without writing any code, enabling secure, scalable, and robust information collaboration across networks, partners, suppliers, and customers that are geographically dispersed while honoring security rules. The platform can be deployed exclusively on cloud or on-prem as well as collectively on both (cloud and on-premises) in a hybrid manner.

# Contact information

eQ Technologic is an international provider of software solutions. Our teams service clients all over the globe from our offices in USA, India, UK and Germany.

### US Offices

eQ Technologic, Inc.
600 Anton Blvd., Plaza Tower,
Suite 2070, Costa Mesa,
CA - 92626, USA
Tel: 1-949-705-6656
Fax: 1-215-359-1378
Toll free: 1-877-279-5732

eQ Technologic, Inc.
500 Office Center Drive,
Suite 400, Fort Washington,
PA-19034, USA
Tel: +1-215-891-9010
Fax: +1-215-359-1378

### India Office

eQ Technologic (India) Pvt. Ltd.
12th floor, The Pavillion,
F.P. No. 403 A/1,
Senapati Bapat Road,
Pune - 411016, India
Tel: +91-20-66472900

### UK Office

eQ Technologic (UK) Limited.
6170 Knights Court,
Birmingham Business Park,
Solihull Parkway,
Solihull, West Midlands,
United Kingdom B37 7YB.
Tel: +44 (0)121 7795744
Fax: +44 (0)161 3868601

### Germany Office

eQ Technologic (Germany) GmbH
De-Saint-Exupéry-Straße 10,
60549 Frankfurt am Main
Deutschland
Tel: +49 151 6143 7996

### E-mail

support@1eQ.com
info@1eQ.com

### Website

http://www.1eQ.com