

MxLoader for Aviation

Tutorial for loading data on Maximo for Aviation using MxLoader

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Table of Contents

[2 Document Control 3](#_Toc459644734)

[2.1 Revision History 3](#_Toc459644735)

[3 Introduction 4](#_Toc459644736)

[4 Model 5](#_Toc459644737)

[4.1 Part Numbers 5](#_Toc459644738)

[4.2 Model 5](#_Toc459644739)

[4.3 Build Items, Labels and Part Numbers 6](#_Toc459644740)

[4.4 Build Hierarchy 6](#_Toc459644741)

[4.5 Zones 6](#_Toc459644742)

[5 Model Rules 7](#_Toc459644743)

[5.1 Configurations and Revisions 7](#_Toc459644744)

[5.2 Mandatory Positions 8](#_Toc459644745)

[5.3 Part Numbers validity 9](#_Toc459644746)

[5.4 Maintenance Plan 10](#_Toc459644747)

[6 Aircraft and Equipment 11](#_Toc459644748)

[6.1 New Aircraft and Equipment 11](#_Toc459644749)

[6.2 Serial numbers 12](#_Toc459644750)

[6.3 Initial Readings and Calendar Aging 13](#_Toc459644751)

[6.4 Aircraft Creation 14](#_Toc459644752)

[6.5 Equipment Aging Data 15](#_Toc459644753)

[7 Technical Publications 16](#_Toc459644754)

[8 Maintenance 17](#_Toc459644755)

[8.1 Master Task Card 17](#_Toc459644756)

[9 Appendix 18](#_Toc459644757)

[9.1 Model Rules Types 18](#_Toc459644758)

[9.2 Using serial number as equipment identifier 19](#_Toc459644759)

[9.3 Workaround for New Aircraft serial number import 21](#_Toc459644760)

# Document Control

## Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Date | Author(s) | Description |
| 1.0 | 2016-08-16 | Bruno Portaluri | First release of the document. |
|  |  |  |  |

# Introduction

This document describes the several steps required to import data in Maximo for Aviation product using MxLoader. The tutorial is structured in chapters divided into logical groups. Each chapter is accompanied by an MxLoader worksheet with the related examples.

* The **Model** chapter describes the steps required to create a simplified Model of an aircraft.
* The **Model Rules** chapter describes how to import some rules in the model.
* The **New Aircraft** chapter guides you through the steps needed to create an aircraft based on the previously defined model. Serial numbers and initial meter readings will also be loaded.
* The **Technical Publications** chapter explains how to create a technical publication and load all the related records.

For sake of clarity, the provided examples and templates include a minimum amount of data and fields. Additional fields can be easily added to the provided templates.

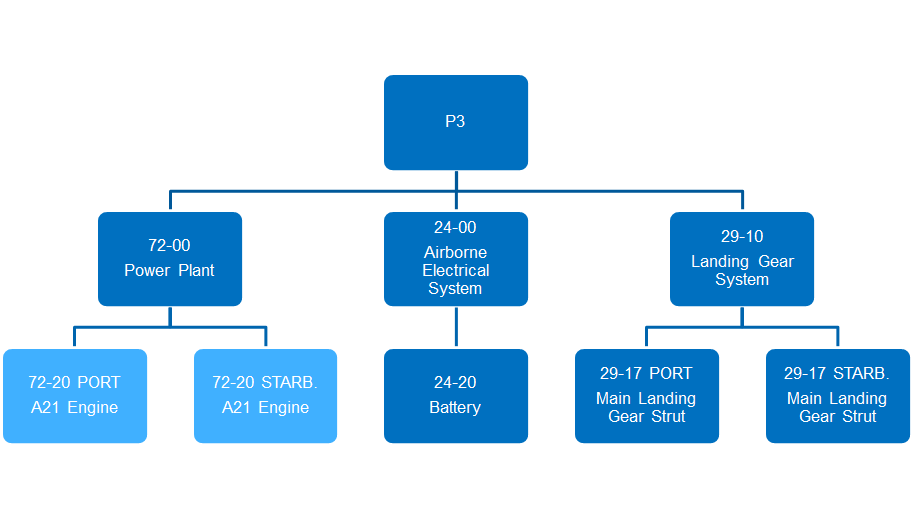
All the examples have been tested with Maximo for Aviation 7.6.3.

# Model

This chapter will guide you through the steps required to create a simplified Model of an aircraft.

All the examples mentioned in this chapter are available in ***MxLoaderMfA 1Model*** Excel file.

The following simplified model of a P3 aircraft will be used in the examples. This is an overly simple model but enough complex to demonstrate how to load the model from Excel. Note that the A21 engines are defined as installable points.



## Part Numbers

Before creating the aircraft Model you need to import the Part Numbers (Inventory Items) that will be included in the model.

Part Numbers are normally entered manually using the ***Inventory > Part Number Master*** application.

The ***PartNumbers*** MxLoader template shows how to load Part Numbers. Note that the part number for the aircraft in not imported since it will be created manually during the creation of the model.

## Model

The Model must be created manually in ***Configuration Management > Models*** application.

Create the P3-1 model entering the following information:

* Model: P3-1
* Description: P3 aircraft
* Code: AIRCRAFT
* Label System: ATA
* Weight UoM, Arm UoM, Moment UoM: set as desired
* Build Items: P3-1 (automatically created)
* Labels: Label System: ATA
* Part Numbers: P3-1 (automatically created)

Save the Model.

* Default Configuration and Revision are automatically created in the Configurations tab.

## Build Items, Labels and Part Numbers

The main tab of the Models application allows to define the full list of build items that comprise the model and what labels and part numbers are applicable for each build item.

The ***Model*** template shows how to load the full set of Build Items, Labels and Part Numbers.

The ***ModelLabels*** and ***ModelPartNumbers*** templates show and alternative way of loading the same data in two separate steps.

* The top-level Build Item, Label and Part Number are already created with the Model are not loaded again.
* The Battery build item has two different compatible part numbers (see green cells).

## Build Hierarchy

The build items are arranged in a hierarchical structure that can be specified in the Build Hierarchy and Position Rules tab of the Models application.

The ***ModelHier*** template shows how to load the build item hierarchy.

* The top-level position is already created with the model and does not have to be imported.

## Zones

Zones are created in the Configuration Management > Zones application.

The ***Zones*** template shows how to load the zones.

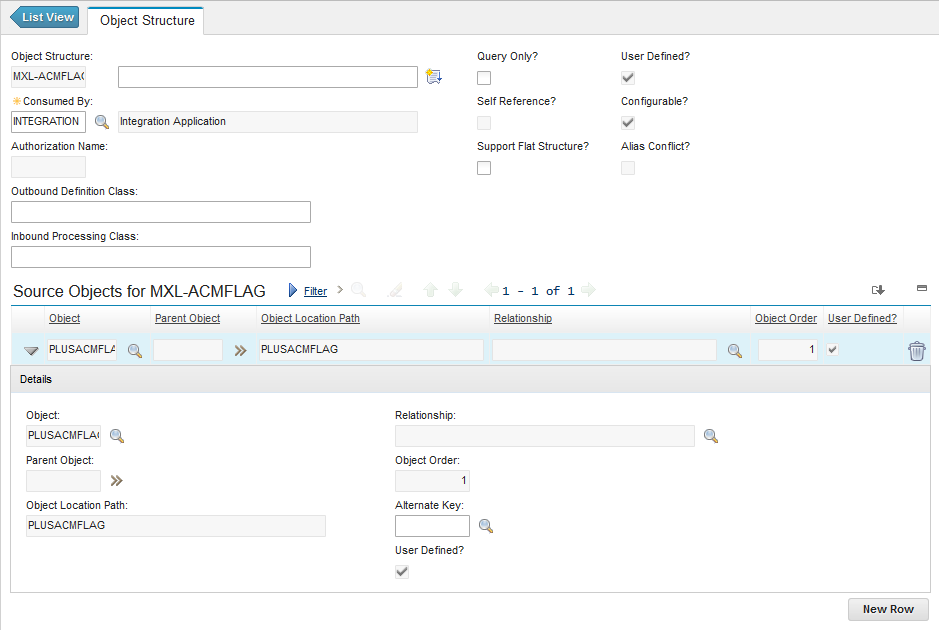
# Model Rules

This chapter will guide you through the steps required to import some position rules of the example P3 aircraft model.

All the examples mentioned in this chapter are available in ***MxLoaderMfA 2ModelRules*** Excel file.

Model rules are stored in PLUSACMFLAG and PLUSACMAPPLE tables. Maximo for Aviation 7.6.2 does not provide integration object structures for such objects so you need to create the following Object structures:

* MXL-ACMFLAG based on PLUSACMFLAG object.
* MXL-ACMAPPLE on PLUSACMAPPLE object.



The rules tables are referencing the related objects using internal IDs. These object IDs must be extracted to be used in the loading template. This is accomplished using the sheets named RefX.

The RefX sheets must be refreshed before importing rules. Note that Ref4 sheet requires a custom Object Structure MXL-MASTERPM based on MASTERPM object.

## Configurations and Revisions

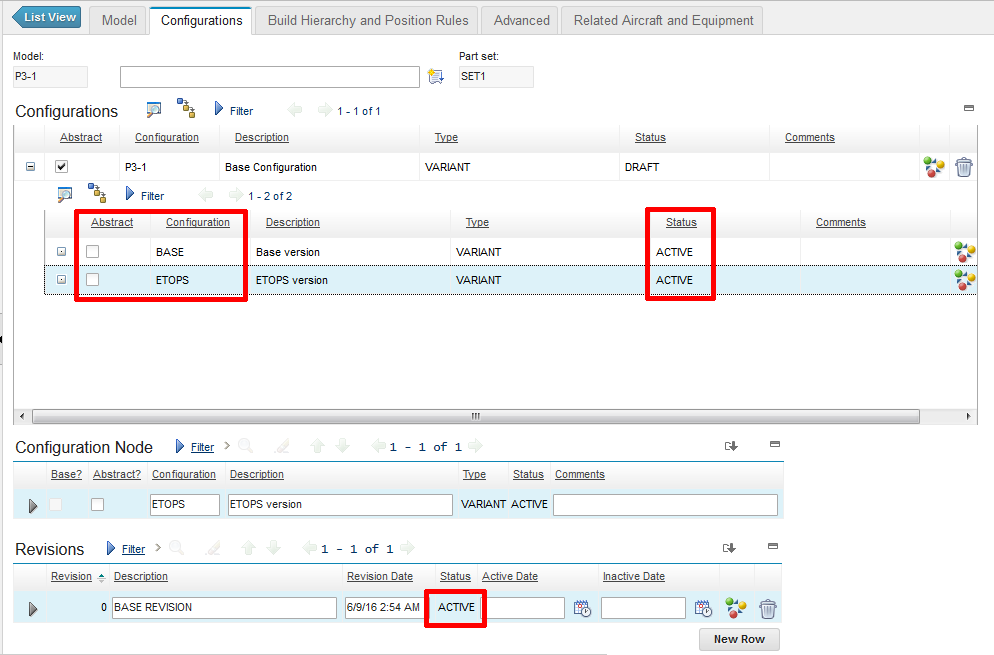
Model Configurations and Revisions can be configured in the *Configurations* tab of the *Models* application.

The safest and simplest way of creating Configurations and Revisions is manually. We suggest not to create these using MxLoader.

For the following examples you have to create two configurations: *BASE* and *ETOPS*.

Don’t forget to activate both configurations and the base revision as well.

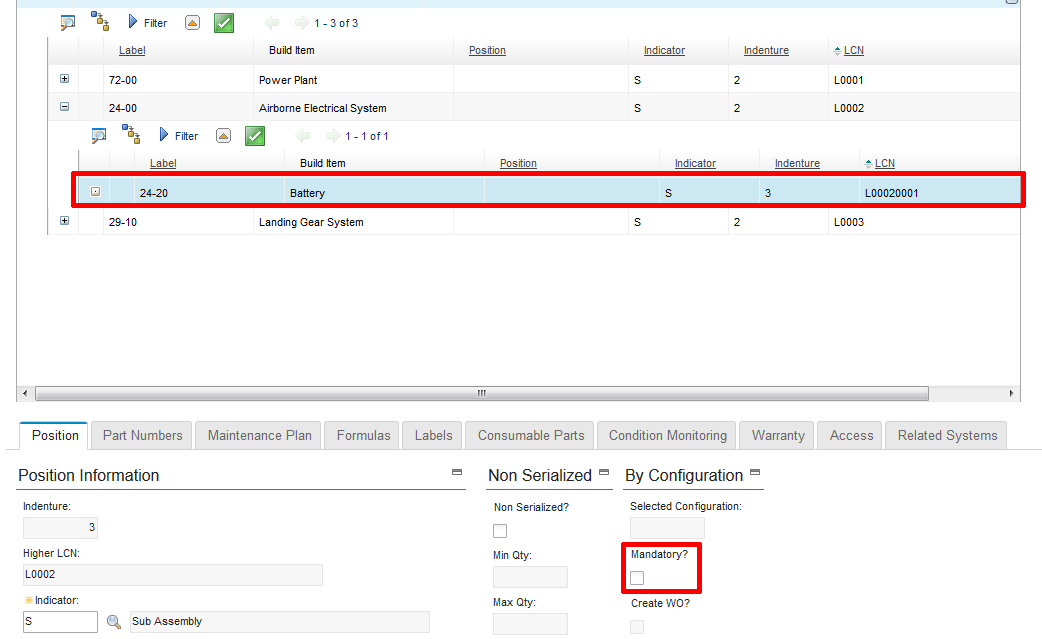
This is how the model configuration should look like.



## Mandatory Positions

Mandatory positions can be set in the Build Hierarchy and Position Rules tab under the Position section.

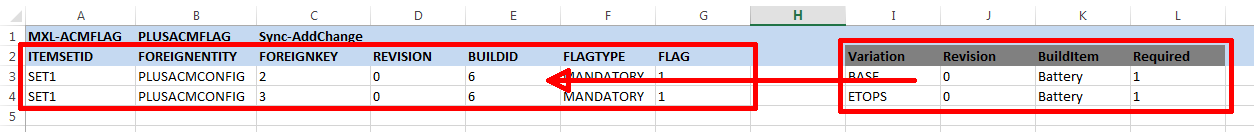
As an example, we will implement a rule to set the *Battery* build item as a required position for *BASE* and *ETOPS* configurations.



Required positions are stored in the ACMFLAG table so we will use the MXL-ACMFLAG object structure to load data. Please refresh data in the Ref1 and Ref2 sheets.

See the ***RuleReqPos*** example to see how to set required positions in the model.

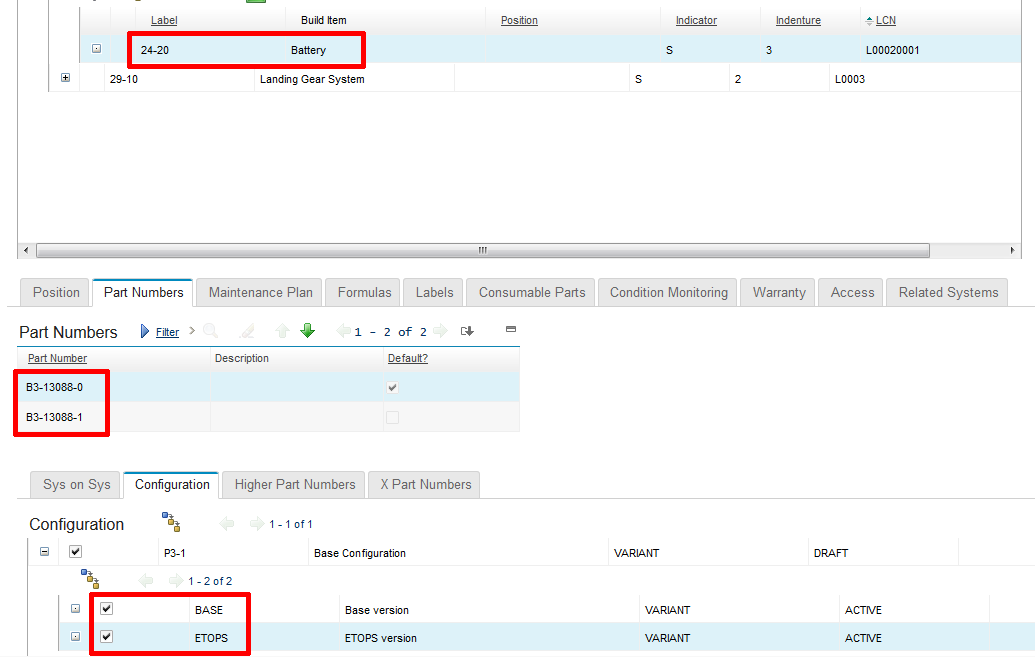
The data is entered in the rightmost columns highlighted in gray. Note how the IDs for columns FOREIGNKEY and BUILDID are calculated using the Ref1 and Ref2 sheet as lookups tables.



## Part Numbers validity

Part numbers validity can be set in the Build Hierarchy and Position Rules tab under the Part Numbers section.

As an example we will implement a rule to do not allow a standard battery to be installed on the ETOPS configuration.



Refer to the **RulePN** sheet.

Considerations:

* The same technique used previously is used to translate the data entered on the right side to the internal IDs used in the MxLoader template on the left side.
* The rule type **HO** is specified in the APPLETYPE field. Refer to the Model Rules Types paragraph in the appendix for more details.
* If you switch to the Advanced tab of the Model application you will see that the rule formula is empty. To calculate the rule formula you can click on the Compile button.
* If you import the same rule more than once you will see duplicated rule in the Advanced tab. This behavior will be fixed in the next fixpacks. Please ensure there are no duplicated rows.

## Maintenance Plan

Maintenance plan validity can be set in the *Build Hierarchy and Position Rules* tab under the *Maintenance Plan* section.

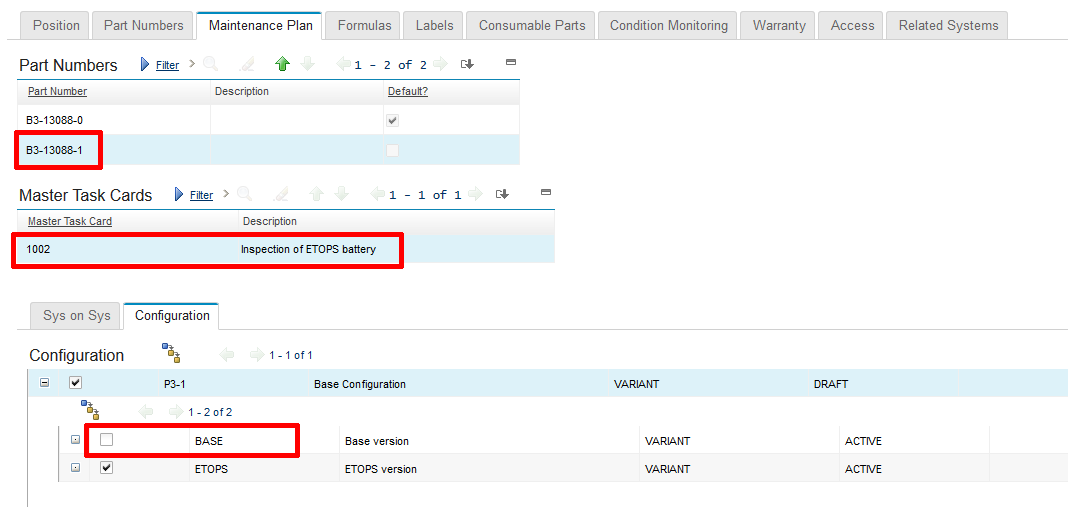
As an example we will implement a rule to assign a Maintenance Plan to the Battery build item.

First of all you have to create a suitable Master Task Card for the B3-13088-1 build item. Open the Master Task Card application in the Preventive Maintenance module and create the following entry.

* Task Number: ETOPS-BATT
* Description: Inspection of ETOPS battery
* Master Task Card Type: CHECK
* Part Number: B3-13088-1

Refresh Ref4 sheet to retrieve the task ID. Ensure that the custom MXL-MASTERPM object structure has been created.

Run the ***RuleMP*** MxLoader sheet to load the following rule.



* The rule type C2 is specified in the APPLETYPE field.
* Refer to the Model Rules Types paragraph in the appendix for more details.

# Aircraft and Equipment

This chapter will guide you through the steps required to create a new aircraft based on the P3 model defined previously.

All the examples mentioned in this chapter are available in ***MxLoaderMfA 3Aircraft*** Excel file.

## New Aircraft and Equipment

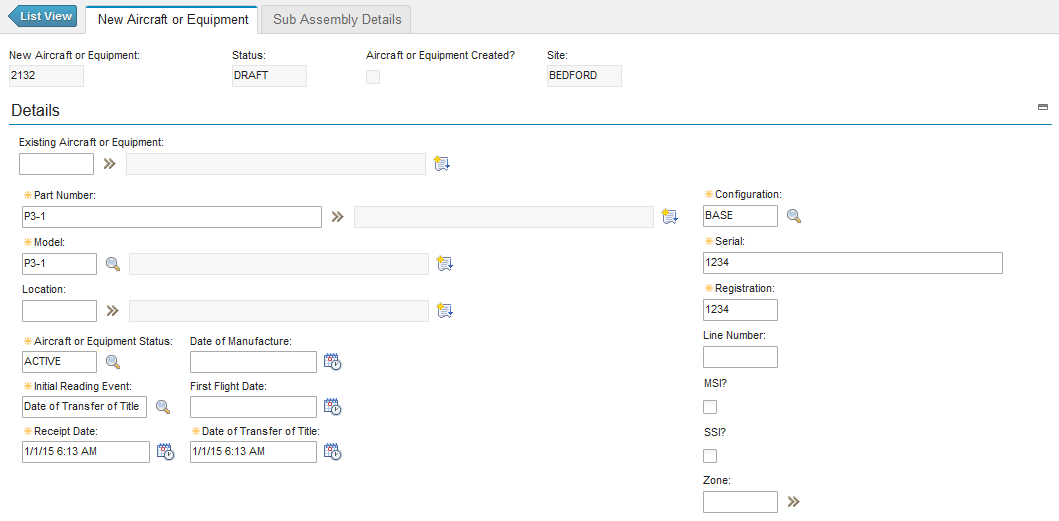
Before proceeding, ensure the P3 model BASE and ETOPS configurations are active and not abstract. Revision 0 must also be active.

Create a new aircraft and its child equipment manually using the *New Aircraft and Equipment* application in the *Aircraft and Equipment* module.

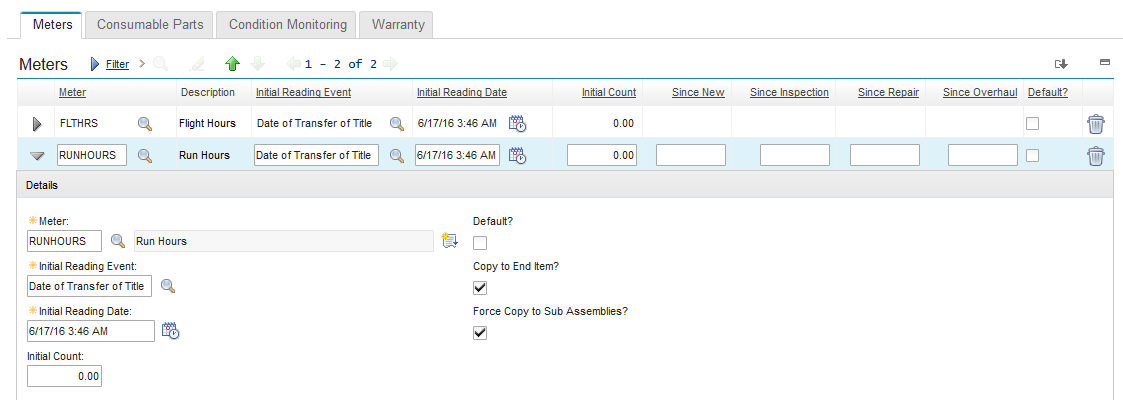
Create a new record and enter P3 part number and P3 [BASE] configuration.

Enter 1st of January 2015 for *Receipt Date* and *Date of Transfer of Title*.

Fill other required fields as well.



Before proceeding we have to create two meters (FLTHRS and RUNHOURS). Ensure the *Force Copy to Sub Assemblies* flag is selected. See screenshot below.



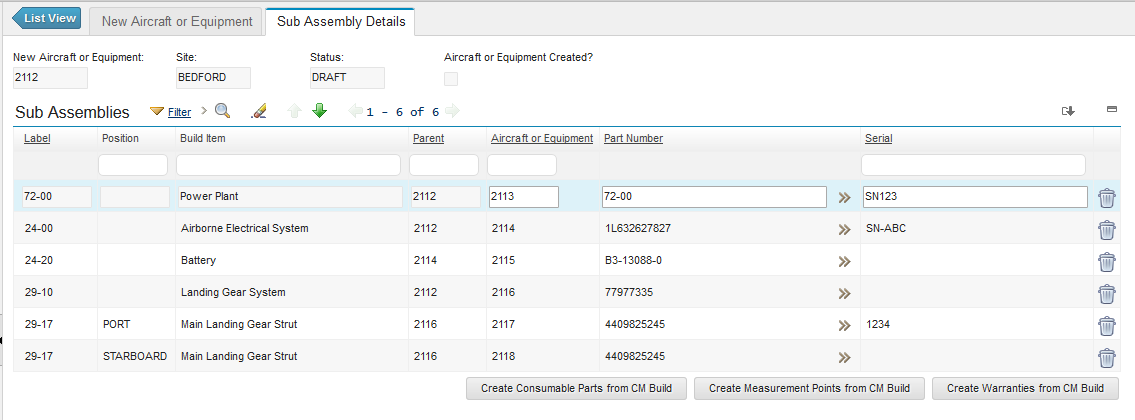
Select the *Create Sub Assemblies from CM Build* action from the menu and save. This will create the subassemblies that are displayed in the *Sub Assembly Details* tab of the application.

Ensure meters are created as well for all the sub assemblies and save.

## Serial numbers

Use the *PartNumbers* MxLoader template to query all the sub-assets of the aircraft. You must specify the identifier of the new aircraft in cell D1.

Set desired serial numbers in column J. Change action to ‘Sync-AddChange’ and run MxLoader. This will set the desired serial numbers in the Sub Assembly Details tab.



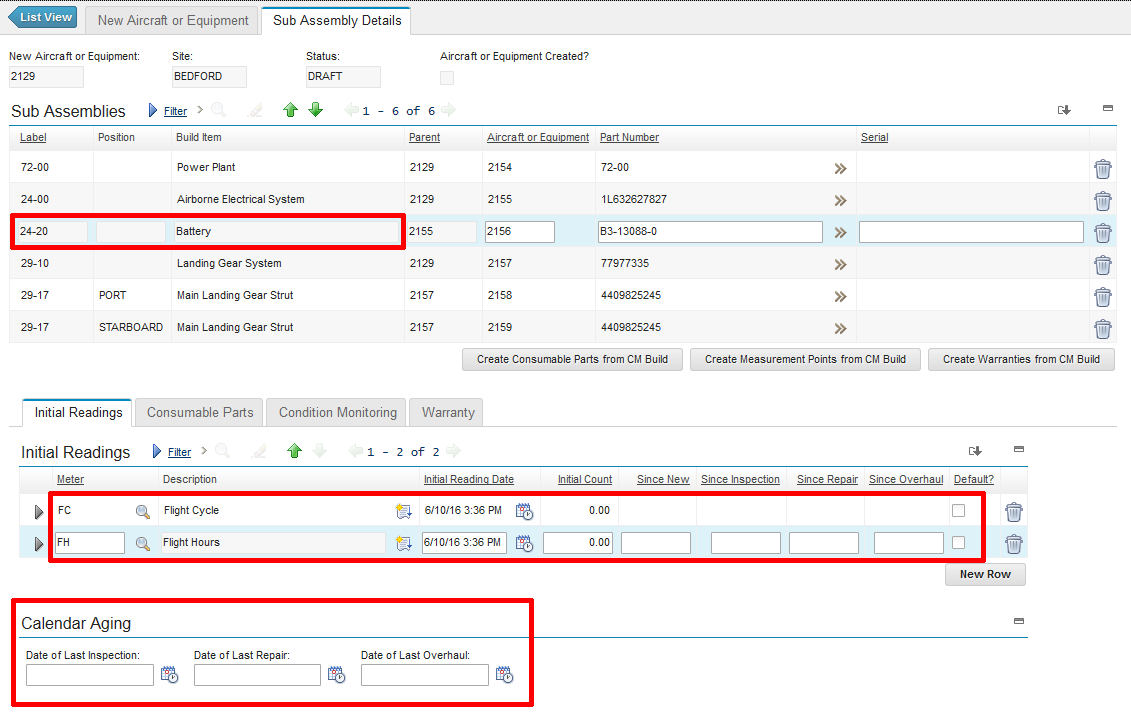
* If sub-assemblies are duplicated or if you get errors using this technique, ensure you have at least Maximo for Aviation 7.6.3 including a fixed MaxPlusACMNewAssetProcess class file.
* In some cases you have also to define a workaround as specified in appendix 9.3

The ***PartNumbers2*** sheet shows how to use the array formula with INDEX and MATCH to search for serial numbers in the *PartNumbersRef* lookup sheet.

See [this article](http://www.exceltactics.com/vlookup-multiple-criteria-using-index-match/) for a complete explanation of how to use INDEX and MATCH.

## Initial Readings and Calendar Aging

The *Sub Assemblies Details* tab of the *New Aircraft and Equipment* application allows to set the initial readings and calendar aging information for each asset.



The ***MeterReadings*** example shows how to load values in the Initial Readings tab.

The ***CalendarAging*** example shows how to load values in the Calendar Aging section.

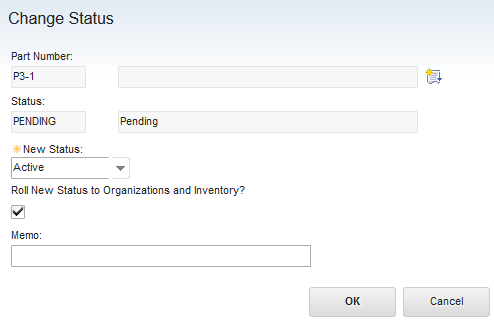
NOTE: The *CalendarAging* template load dates into Maximo. To correctly manage dates on extended attributes with MxLoader you first have to do refresh the data dictionary. Open the MxLoader Excel ribbon and click on *Create Custom Object Structures* and then *Refresh Data Dictionary*. After this the dates in the *CalendarAging* sheet will be recognized by MxLoader and managed correctly.

## Aircraft Creation

Aircraft can be created manually using the **Create Aircraft or Equipment** action from the menu.

Please create the aircraft instance defined in this chapter before proceeding.

Depending on your settings, you may need to activate the P3 part number in the Part Number Master application. Don’t forget to select the *Roll New Status to Organizations and Inventory* flag to activate the item in your organization.



## Equipment Aging Data

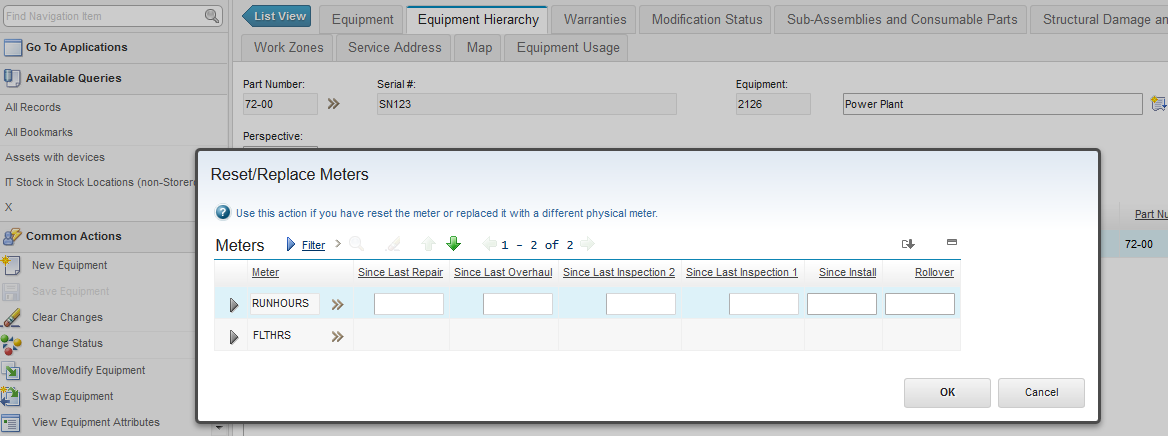
After the new aircraft and related equipment have been created it is possible to update the aging information in *Equipment* application under the *Aging Data* section of the *Equipment* tab.

By updating the *Date of Last Overhaul, Date of Last Inspection 2, Date of Last Inspection 1, Date of Last Repair* fields the Remaining, Actual, Interval, At Installation tables are automatically populated.

The ***EqMeterReadings*** example shows how to load values in the *Initial Meter Value* tab.

The ***EqCalendarAging*** example shows how to load values in the *Calendar Aging* section.

The Equipment application has also an action called ‘Reset/Replace Meters’ that can set additional meter values.



The ***EqMeterReset*** example shows how to populate this data. Note that for each meter value the corresponding reset date must be specified.

# Technical Publications

Technical publications can be managed in the *Technical Publications* application in the *Configuration Management* module.

The ***MxLoaderMfA 4TechPub*** Excel file provides examples of how to create a technical publication and add related records to it.

* The ***TechPub*** worksheet can be used to create one or more technical publications.
* The ***TP Build Items*** fills data in the *Build Items* tab.
* The ***TP Part Numbers*** fills data in the *Part Numbers* tab.
* The ***TP Models*** fills data in the *Models* tab.
* The ***TP Build Pos*** fills data in the *Build Positions* tab. Alternatively the ***TP Build Pos AC*** created the build positions automatically simulating the press of the *Auto Create and Refresh* button.
* The ***TP Maint Plans*** fills data in the *Maintenance Plans* tab.

# Maintenance

This chapter will guide you through the steps required to create a maintenance records for the P3 aircraft.

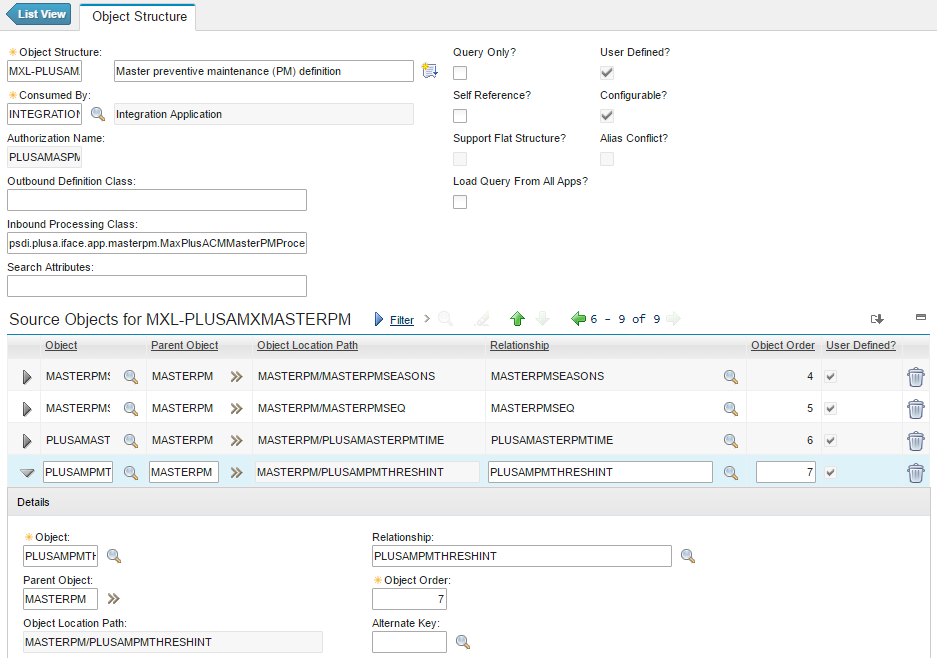
All the examples mentioned in this chapter are available in ***MxLoaderMfA 5Maintenance.xlsm*** Excel file.

## Master Task Card

The ***Master Task Card*** template shows how to create a simple Master Task Card.

The ***Part Numbers*** template shows how to associate two part numbers (battery for BASE and ETOPS variations) to the Master Task Card.

The *Intervals and Thresholds*tab of the *Master Task Card* application is based on the PLUSAMPMTHRESHINT object that is not available in the PLUSAMXMASTERPM object structure. To overcome this limitation you have to duplicate PLUSAMXMASTERPM object structure to MXL-PLUSAMXMASTERPM and add the PLUSAMPMTHRESHINT child object.



After having created the custom PLUSAMXMASTERPM object structure you can use the ***Intervals Thresholds*** template to create time and meter based frequencies for the Master Task Card.

# Appendix

## Model Rules Types

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Rule Description | Type | RX1 | RX2 | RX3 | RY1 | RY2 | RY3 |
| Position applicability to Path | **X1** | Path |  |  | Build |  |  |
| Position applicability to Variation | **XF** | Config |  |  | Build |  |  |
| Position applicability to Variation E-I SR | **XE** | SR |  |  | Build |  |  |
| Label applicability to Path | **X4** | Path |  |  | Build | Label |  |
| Label applicability to Variation | **X5** | Config |  |  | Build | Label |  |
| Part applicability to Path | **H1** | Path |  |  | Build | Cat |  |
| Part applicability to other Part | **H2** | Build | Cat |  | Build | Cat |  |
| Part applicability to other Part SR | **H3** | Build | Cat | SR | Build | Cat |  |
| Part applicability to Variation | **HO** | Config |  |  | Build | Cat |  |
| Part applicability to E-I SR | **HN** | SR |  |  | Build | Cat |  |
| Task applicability to Path | **C1** | Path |  |  | Build | Cat | Event |
| Task applicability to Variation | **C2** | Config |  |  | Build | Cat | Event |
| Task applicability to E-I SR | **C3** | SR |  |  | Build | Cat | Event |
| Formula applicability to Path | **C4** | Path |  |  | Build | Meter | Formula |
| Formula applicability to Variation | **C5** | Config |  |  | Build | Meter | Formula |
| Formula applicability to E-I SR | **C6** | SR |  |  | Build | Meter | Formula |

|  |  |
| --- | --- |
| Key | Related Table ID field |
| Path | PLUSACMPATH.PLUSACMPATHID |
| Build | PLUSACMBUILD.PLUSACMBUILDID |
| Label | PLUSACMLABEL.PLUSACMLABELID |
| Cat | PLUSACACAT.PLUSACACATID |
| Config | PLUSACMCONFIG.PLUSACMCONFIGID |
| SR | PLUSACACATSR.PLUSACACATSRID |
| Event | MASTERPM.MASTERPMID |
| Meter | METER.METERID |
| Formula | PLUSACMFORMULA.PLUSACMFORMULAID |

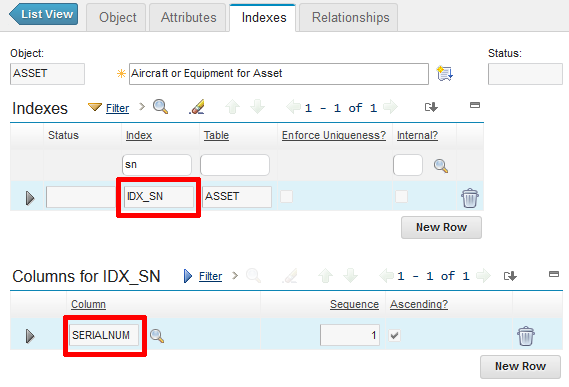
## Using serial number as equipment identifier

Aircraft and equipment are stored in the ASSET table. By default Maximo uses the couple ASSETNUM, SITEID as the primary key of the ASSET table. That’s why all the templates that are loading data using the MXASSET object structure are using these fields to uniquely identify records.

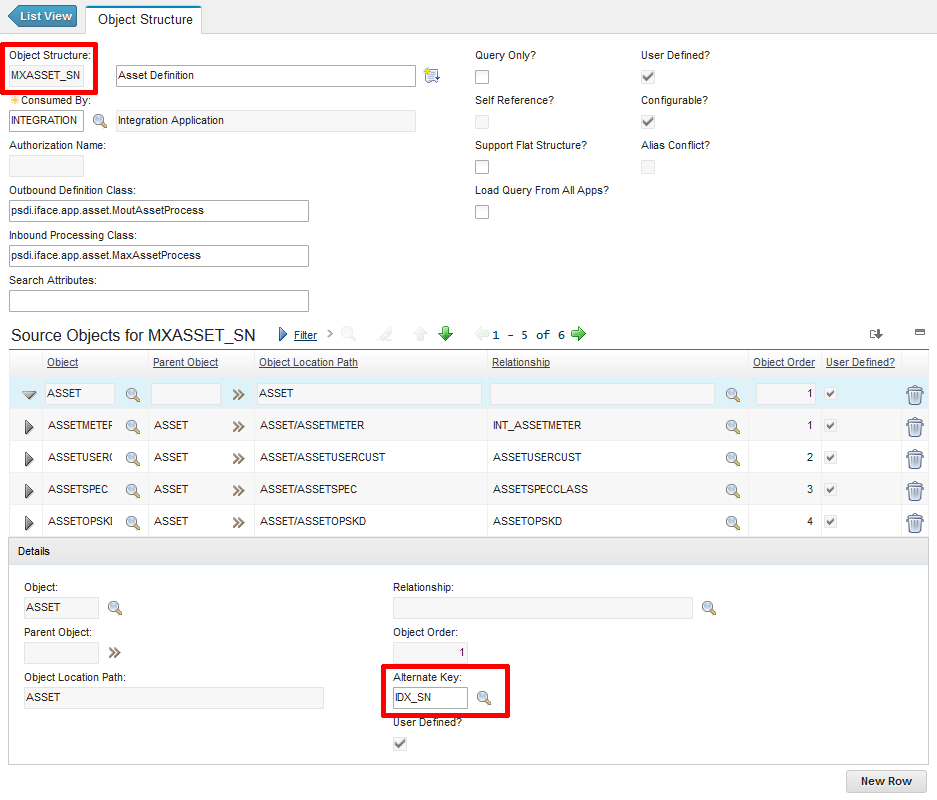
If you have unique serial numbers for the equipment and you want to use this to identify records in the ASSET table you can follow this procedure

Open the main object you have to import (see cell B1) with the Database Configuration app in Maximo.

Define new index IDX\_SN on SERIALNUM field.



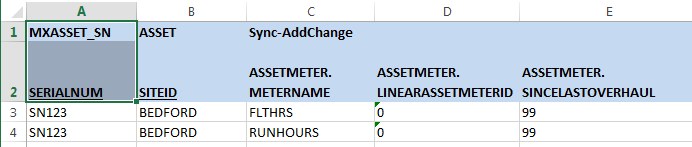
Duplicate the Object Structure used in the MxLoader template (see cell A1 of the worksheet). Set the new name with a ‘\_SN’ suffix. Set IDX\_SN as the alternate key on the object.



Change the Object Structure name in cell A1 of the loading template.

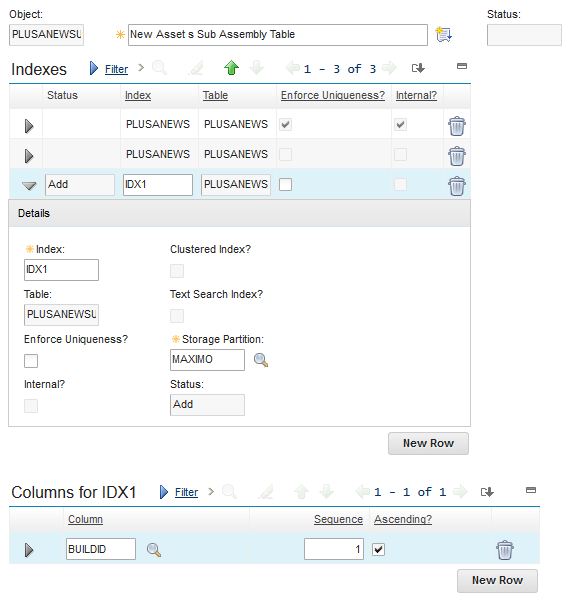
Modify the object identifier in cell A2 to SERIALNUM.

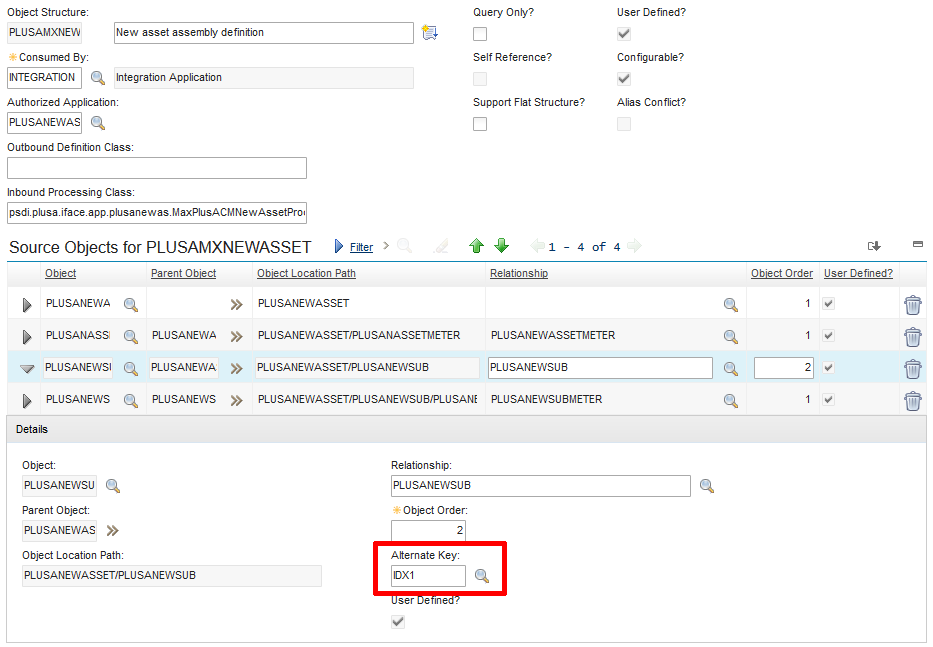
Now you can use serial numbers as the primary object identifiers.



## Workaround for New Aircraft serial number import

Define a new non-unique index on PLUSANEWSUB.BUILDID





Apply database changes (configdb).

Set that index as the alternate key on object structure (PLUSAMXNEWASSET/PLUSANEWSUB)