

PLMJobManager - Presentation Compare NX Data via CheckBox

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Introduction – initial situation

CheckBox is a solution to extract geometrical data, non geometrical data and drawings from NX-Parts for comparison, to detect differences between these parts.

Ever NX Version change raises the following questions:

- Does “**my data**” change because of the conversion to the new NX version?
- Can “**my data**” still be opened, update, edit and saved?
- Is “**my data**” in the new version in the same way manageable as in the current productive version?

This questions can only be answered when the “**own data**” is verified through appropriate methods!

A manual verification is very comprehensive and requires a **huge amount of time**. In addition, the tests are only successful if such manual checks are performed systematically. The **immense time** required for manual testing in practice leads to the fact that this part of the conversion is usually treated only superficially.

To answer these questions the software **CheckBox** was developed in cooperation with the companies **BSH, KBA, MTU, Renk, ASML** and **S-PLM**

Introduction – initial situation

The goal:

Developing a tool that answers the following question:

**Are the data in the new version
the same as in the old version?**

The following slides show you the concept on how to check the data in a save way with the help of the NXCheckBox and the PLMJobManager.

Introduction CheckBox Process Overview

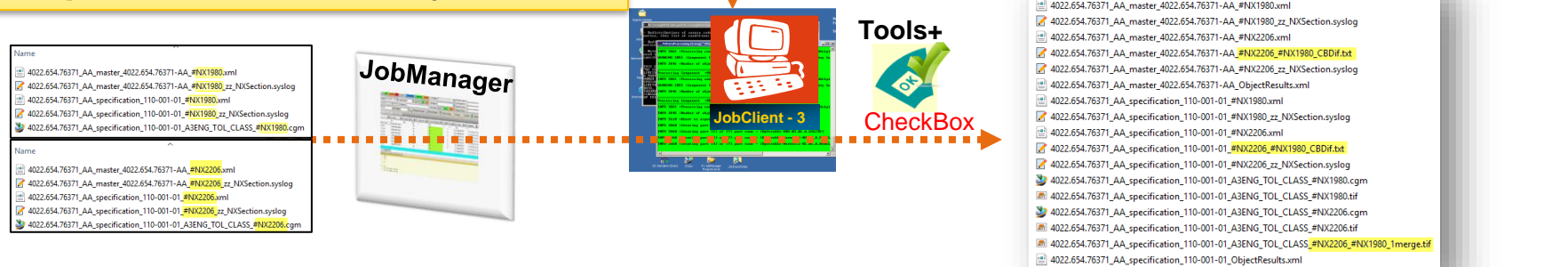
Step 1: Extraction NX1992 Data



Step 2: Extraction NX2206 Data



Step 3: Generate the analysis data



Introduction NXCheckBox Data Extraction

After extracting NXCheckBox Data the CB.Log files is analysed an the results are listed as partial Results. The following list shows how we do classify the NXCheckBox extraction Results.

- PL = Part load 1
- UF = Update all Feature 2
- UD = Update Drawing 3
- PH = Part Header 4
- MD = Model Data 5
- AS = Assembly Data 6
- DR = Drawing Data 8
- EN = Entity 9
- CBXml = CB.Data File (xml) 9
- CGM = Drawing .cgm Files 10

The results of extracting data is imported into the JobServer Database.

```
[677] doune init program result file
[680] single_part = #D:\NxData\BgStrukNx75\BgStrukEx-Einzelteil
[721] Loading part
Info: Memory Load = 33
Info: dwAvailPhys = 11109156
Info: dwAvailPageFile = 26648496
Info: dwAvailVirtual = -586564

=====
Start Check at Sat Feb 02 14:49:28 2013

[496] partname = #D:\NxData\BgStrukNx75\BgStrukEx-Einzelteil-0
Info: Part = D:\NxData\BgStrukNx75\BgStrukEx-Einzelteil-04_dwg
Info: xml_file = D:\NxData\BgStrukNx75\BgStrukEx-Einzelteil-04
[537] xmlfile = #D:\NxData\BgStrukNx75\BgStrukEx-Einzelteil-04

-----
[541] do the update
Update: All Features 2
Update: All Features ---> passed
Update: Drawing views 3
Update: Drawing views ---> passed
[543] done the update

-----
Info: init_xml_file
Info: init_xml_file --> passed
Info: write_xml_header
Info: write_xml_header --> passed
Info: Part Header Section 4
Info: Part Header Section --> passed
Info: Check_Model Section 5
Info: Check_Model Section --> passed
Info: Check_Assembly Section 6
Info: Check_Assembly Section --> passed
Info: Check_Drawing Section 7
Info: Check_Drawing Section --> passed
Info: Check_Entities Section 8
Info: Check_Entities Section --> passed
Info: write_xml_end Section 9
Info: write_xml_end Section --> passed

-----
CGM: Output (Sheet 1) to [D:\NxData\BgStrukNx75\BgStrukEx-Ein
CGM: Cgm_Def_Color_Option = UF_PLOT_BLACK_ON_WHITE 10
CGM: Cgm_Def_Color_Option = UF_PLOT_BLACK_ON_WHITE --> passed

-----
Finished checking at Sat Feb 02 14:49:31 2013
```

Introduction NXCheckBox Compare Data

NX1992.xml
NX2206.xml

```

<> PLMJobManager_CheckBoxData xmlns:xsi="http://www...
#<< ProgramData
#<< RunData
  StartLoadPartDateTime: 2010-05-22 12:07:13
  EndLoadPartDateTime: 2010-05-22 12:07:15
  StartLoadPartMemoryAllocation: 1843576
  EndLoadPartMemoryAllocation: 1842232
  Action
  DetailOption: 2,3,4,5,6,7,8,26
  StartUpdateDateTime: 2010-05-22 12:07:15
  UpdateAllFeaturesReturnVal: -1
  StructureSyncReturnVal: -1
  UpdateAllViewsReturnVal: -1
  EndUpdateDateTime: 2010-05-22 12:07:15
  StartDateTime: 2010-05-22 12:07:15
  NxData
    NXRelease: NX V4.0
    NXVersion: 104.0
  AssemblyLoadOptions
  CheckBoxData
    PartHead
    ModelData
    Refset
    Name: Entire Part
    Volume: 1342.584642
    VolumeBodies_n: 2
    Feature3D_n: 0
    CentreOfGravity
    MomentOfInertia
    Refset
    ModelDataBase
    Layers
  AssemblyData
    PartArrangements
    Components
  Drawings
    Drawing
      Name: SHT1
      ViewDependentObjects_n: 0
      RetainedObjects_n: 0
      Drawing_VIEWS_n: 4
    Views
  Entities
    Entity xsi:type="Entity_Type26_SubType2"
    Entity xsi:type="Entity_Type26_SubType1"
  RunDataPerformance
    EndDateTime: 2010-05-22 12:07:15

<> PLMJobManager_CheckBoxData xmlns:xsi="http://www...
#<< ProgramData
#<< RunData
  StartLoadPartDateTime: 2010-05-26 17:58:00
  EndLoadPartDateTime: 2010-05-26 17:58:01
  StartLoadPartMemoryAllocation: 1753136
  EndLoadPartMemoryAllocation: 1751792
  Action
  DetailOption: 26
  StartUpdateDateTime: 2010-05-26 17:58:01
  UpdateAllFeaturesReturnVal: -1
  StructureSyncReturnVal: -1
  UpdateAllViewsReturnVal: -1
  EndUpdateDateTime: 2010-05-26 17:58:01
  StartDateTime: 2010-05-26 17:58:01
  NxData
    NXRelease: NX V5.0
    NXVersion: 105.0
  AssemblyLoadOptions
  CheckBoxData
    PartHead
    ModelData
    Refset
    Name: Entire Part
    Volume: 1342.584642
    VolumeBodies_n: 2
    Feature3D_n: 0
    CentreOfGravity
    MomentOfInertia
    Refset
    ModelDataBase
    Layers
  AssemblyData
    PartArrangements
    Components
  Drawings
    Drawing
      Name: SHT1
      ViewDependentObjects_n: 0
      RetainedObjects_n: 0
      Drawing_VIEWS_n: 4
    Views
  Entities
    Entity xsi:type="Entity_Type26_SubType2"
    Entity xsi:type="Entity_Type26_SubType1"
  RunDataPerformance
    EndDateTime: 2010-05-26 17:58:01
  
```

Compare → having Differences? **YES** **NO**

Create extended Data:
 - DifReport.txt
 - Dif.tif

In this case it is required to Check what is the reason for this differences !

Result Is OK

Introduction NXCheckBox Details off Extracted XML Data

Job Data:

```

  ▾--<> ProgramData
    ... ProgramName: NxCheckBox
    ... ProgramRelease: V1.1.1.18
    ... BuildDate: (May 20 2010)
    ... CustomLicense: unknown
  ▾--<> RunData
    ... StartLoadPartDateTime: 2010-05-26 17:58.00
    ... EndLoadPartDateTime: 2010-05-26 17:58.01
    ... StartLoadPartMemoryAllocation: 1753136
    ... EndLoadPartMemoryAllocation: 1751792
    <> Action
    ... DetailOption: 26
    ... StartUpdateDateTime: 2010-05-26 17:58.01
    ... UpdateAllFeaturesReturnValue: -1
    ... StructureSyncReturnValue: -1
    ... UpdateAllViewsReturnValue: -1
    ... EndUpdateDateTime: 2010-05-26 17:58.01
    ... StartDateTime: 2010-05-26 17:58.01
  ▾--<> NxData
    ... NXRelease: NX V5.0
    ... NXVersion: 105.0
  ▾--<> AssemblyLoadOptions
    ... load_options: 1 [UF_ASSEM_load_from_search_dirs]
    ... parts_list: 0
    ... update: 1 [UF_ASSEM_update_report]
  
```

ModelData:

```

  ▾--<> ModelData
    ▾--<> Refsets
      ▾--<> Refset
        ... Name: Entire Part
        ... Volume: 1342.584642
        ... VolumeBodies_n: 2
        ... Feature3D_n: 0
        ▾--<> CentreOfGravity
          ... X: 10.078155
          ... Y: 7.560351
          ... Z: 1.238954
        ▾--<> MomentOfInertia
          ... X: 815346.315993
          ... Y: 1455367.113393
          ... Z: 2220782.513485
      ▾--<> Refset
    ▾--<> ModelDataBase
      ▾--<> Features
        ... TotalFeatures_n: 0
        ... AliveFeatures_n: 0
        ... SuppressedFeatures_n: 0
        ... CondemnedFeatures_n: 0
        ... DeletedFeatures_n: 0
        ... TemporaryFeatures_n: 0
      <> Bodies
  
```

Component:

```

  <> Components
  ▾--<> Component
  ▾--<> Component
    ... File: %UGMGR=V3.2 PH=QnBdUZwmVe1p
    ... Handle: RM%UL=V1.0 PH=wTDdUZwmVe
    ... SuppressState: 0
    <> SuppressByExpression
    <> ReferenceComponent
    ... RefsetCurr: EINFACH
    ... InstanceName: BGSTRUKEX-KBG-01_01
    ... ComponentLevel: 2
    ... Callout: 10
    ... MemberCount: 59
  ▾--<> ComponentArrangement
    ... UsedArrangement: Arrangement 1
  <> Mating
  ▾--<> Matrix
    ... X1: 1.000000
    ... Y1: 0.000000
    ... Z1: 0.000000
    ... X2: 0.000000
    ... Y2: 1.000000
    ... Z2: 0.000000
    ... X3: 0.000000
    ... Y3: 0.000000
    ... Z3: 1.000000
    ... originX: 360.000000
    ... originY: -420.000000
    ... originZ: 0.000000
  
```


Introduction NXCheckBox Details of Difference Report

DifReport.txt

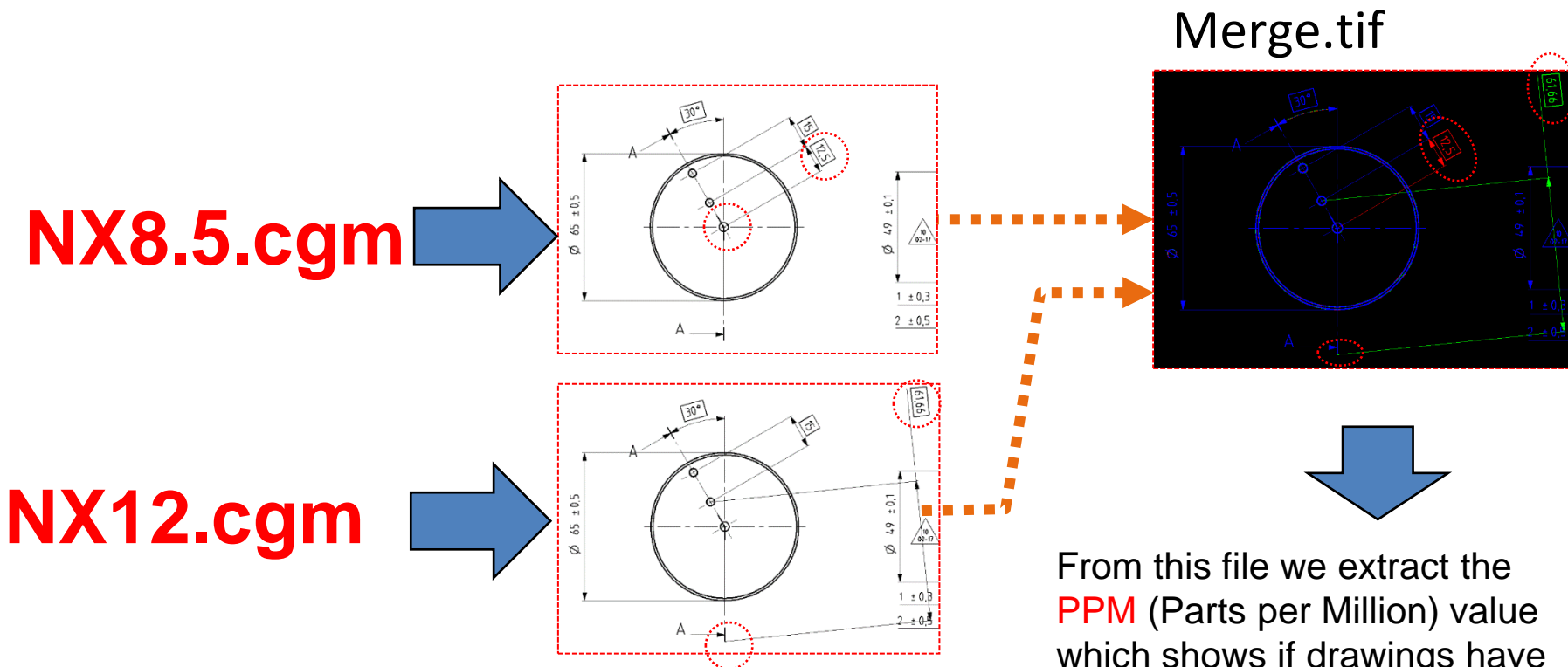
```

0      10      20      30      40      50      60      70      80      90      100     110     120     130     140     150
1 CheckBox Report:
2 JM CheckBoxVer...:V2.696 (Build:26.10.2010)
3 Date.....:26.10.10 22:37:10
4
5 CheckBox.Data 1:[NX V3.0[103.0]] |CheckBox.Data 2[NX V7.5[107.0]]
6 -----|-----
7 CliName.:[@DB/4022.625.4014/2/specification/110-001-01] |CliName.:[@DB/4022.625.4014/2/specification/110-001-01]
8 PartDesc: |PartDesc:
9 PartHis.:~ |PartHis.:25 19 Oct 10 00:55 NT Intel jfeuerst NX 7.5.1.5 - External U~
10 PartHis.:24 18 Oct 10 22:29 NT Intel jfeuerst NX 3.0.3.2 - External ~|PartHis.:24 29 Jul 10 11:47 NT Intel JFeuerst NX 7.5.0.32 (NX Manager~
11 PartHis.:23 10 May 10 17:00 NT Intel gmiddel NX 3.0.3.2<!<OT_PUB>!> |PartHis.:23 10 May 10 17:00 NT Intel gmiddel NX 3.0.3.2<!<OT_PUB>!>
12 PartHis.:22 10 May 10 16:41 NT Intel gmiddel NX 3.0.3.2<!<OT_PUB>!> |PartHis.:22 10 May 10 16:41 NT Intel gmiddel NX 3.0.3.2<!<OT_PUB>!>
13 PartHis.:21 10 May 10 16:32 NT Intel gmiddel NX 3.0.3.2<!<OT_PUB>!> |PartHis.:21 10 May 10 16:32 NT Intel gmiddel NX 3.0.3.2<!<OT_PUB>!>
14 -----|-----
15 Data extraction info: |Data extraction info:
16 NxVer...:NX V3.0[103.0] |NxVer...:NX V7.5[107.0]
17 NxCB.Rel:V1.1.1.18 Build:(Aug 27 2010) |NxCB.Rel:V1.1.1.18 Build:(May 20 2010)
18 Date....:18.10.10 22:29:51 |Date....:19.10.10 00:55:03
19 =====|=====
20 CheckBox Compar Result:
21 ResultIsErr.....:True
22 ResultHasWaring...:True
23 ResultCode.....:64
24 ResultCodeBinary.:64
25 ResultMsgShort...:[PH:OK] [MD:OK] [AS:OK] [DR:OK] [EN:64 Msg:Err:Origin] [Pef:OK]
26 =====|=====
27 CheckBox compar report:
28 PartHistoCheck: OK
29 Warning:DR (32):[ViewDependentObjects_n].[A3ENG_NEW]:[Value Differ(<>)]!
30 |->NX V3.0[103.0]: 74
31 |->NX V7.5[107.0]: 73
32 ++Error:EN(64):[Origin]:[X:[240.553540] Y:[291.117523] Z:[0.000000]]
33 |->NX V3.0[103.0]: [Type:[26] Subtype:[3] Desc:[UF_dim_parallel] Name:[] Handle:[RM*UL=V1.0 PH=gBmdYwshQS4FxA AUID=Rgod6KgTQS4FxA R0000820300000018]
34 | Origin:[X:[153.753462] Y:[241.003475] Z:[0.000000]] Texts:[12,5]]
35 |->NX V7.5[107.0]: [X:[153.753462] Y:[241.003475] Z:[0.000000]]
36 Warning:EN(64):[Texts.Text]:[61,66]
37 |->NX V3.0[103.0]: [Type:[26] Subtype:[3] Desc:[UF_dim_parallel] Name:[] Handle:[RM*UL=V1.0 PH=gBmdYwshQS4FxA AUID=Rgod6KgTQS4FxA R0000820300000018]
38 | Origin:[X:[153.753462] Y:[241.003475] Z:[0.000000]] Texts:[12,5]]
39 |->NX V7.5[107.0]: [12,5]
40 PerfDif.LoadPart.Factor>1.2 Warning:4.00sec(Nx7.5)/1000msec(Nx3)=4.0[PerfDifFactor]
..

```

Introduction NXCheckBox Analyze Data Compare Drawings

NXCheckBox extracts CGM files from specifications. These CGM files are used to create output data.



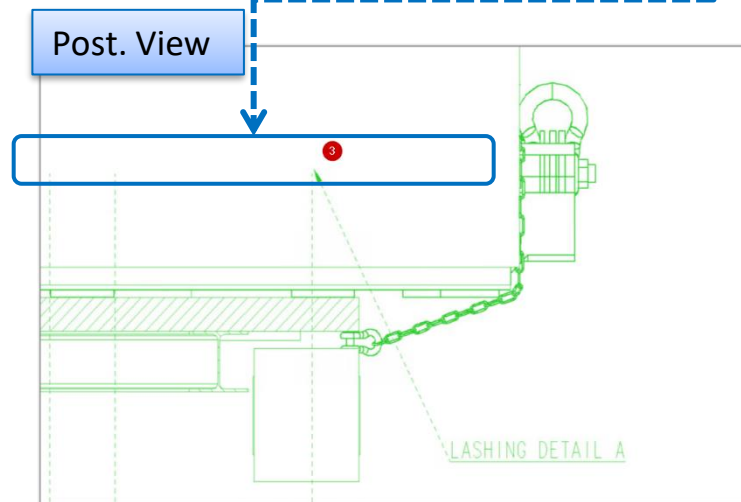
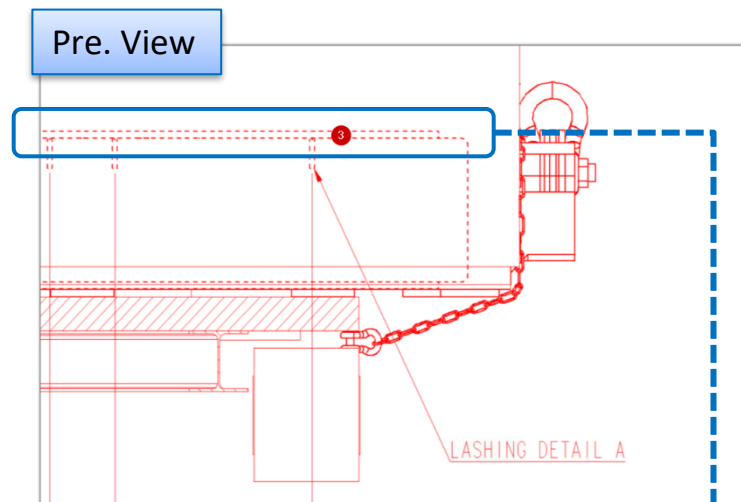
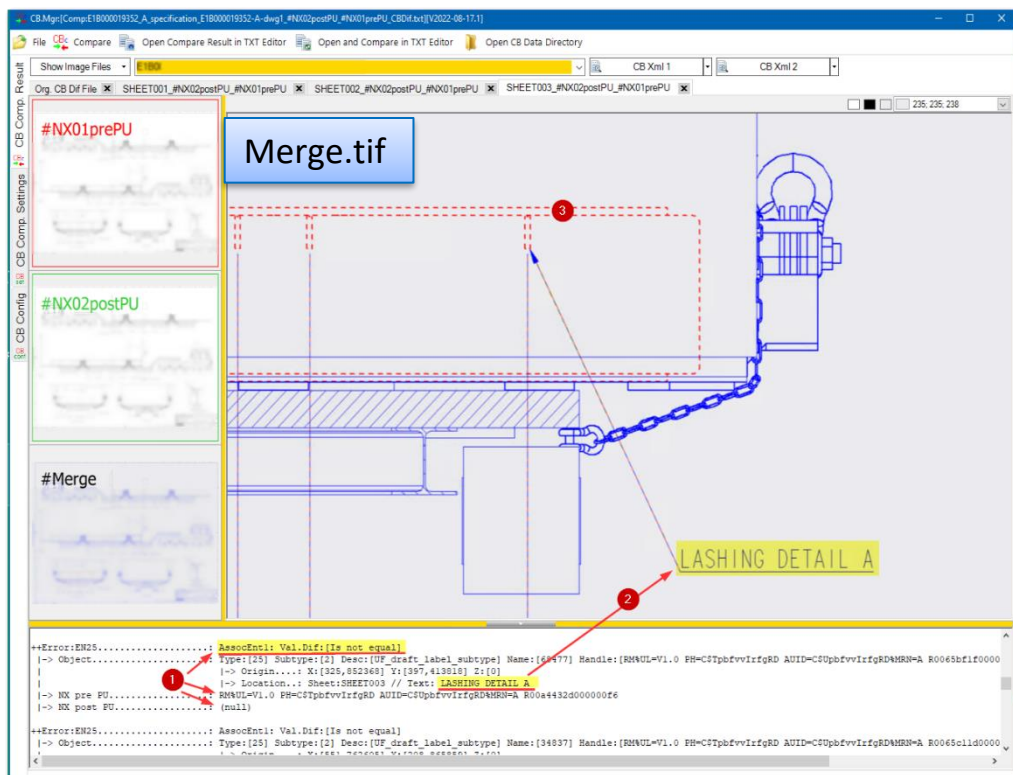
From this file we extract the **PPM** (Parts per Million) value which shows if drawings have differences.

The Merge.tif image file is also be used to see quick differences between drawings.

This method was developed by **Thomas Körner** from **B/S/H**.

Introduction NXCheckBox Analyze Data Compare Drawings

Example below shows an Issue found by missing AssocEnt1 (1)



In this case the Issue that Label (2) is missing Associativity where cause because in Post View Lines (3) are Missing on some reasons.
The Issue were found at the Dif Report (1) and also at the Tif compare (3)

Introduction CheckBox Analyze Data Compare CB.xml files

All analyzed Data from XML and from Drawing compare will be combined to one Result:

- PH = Part Header (from XML) 1
- MD = Model Data (from XML) 2
- AS = Assembly Data (from XML) 3
- DR = Drawing Data (from XML) 4
- EN = Entity Data Dim/Text (from XML) 5
- PPM= Dif.tif (from Drawing compare) 6

- If the Result Value is = 0 no differences between the part's are found.

Example:

[PH:OK] [MD:OK] [AS:OK] [DR:OK] [EN:OK] [PPM:OK]



- If the Result Value is > 0 there are differences between the Parts → the Parts must be checked !

Example:

[PH:OK] [MD:ERR:Lay;Refs;] [AS:OK] [DR:OK] [EN:OK] [PPM:3078]



Introduction CheckBox performance data recording

NXCheckBox in combination with PLMJobManager can also be used to record NX performance Data.

The princip is that timestamps in CheckBox.xml files are used to harvest the performance data and to collect them into an Excel file. This Data can then be used to analyze the NX performance.

System Sketch

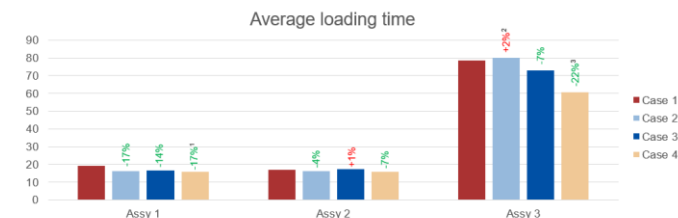


Result: extracted NX12 Data

Category	Timestamp	Load (sec)	Update (sec)	Extract (sec)	Entire Duration (sec)	Measure Number	Average Load Duration (sec)	Average Update Duration (sec)	Average Extract Duration (sec)	Average Entire Duration (sec)
1	17.08.2018 10:14:59	95	4	133	232	1	95	4	133	232
2	17.08.2018 10:18:53	14	2	136	152	2	34,5	8	134,5	192
3	17.08.2018 10:22:39	14	2	133	149	3	41	2,667	134	177,667
4	17.08.2018 10:26:26	14	3	133	150	4	34,25	2,75	133,75	170,75
5	17.08.2018 10:31:19	14	3	133	150	5	30,2	2,8	133,6	166,6
6	17.08.2018 10:38:48	14	3	139		6	27,5	2,933	134,5	164,933

No.	Type	Description	Options
01	Load Duration	This is the time from opening a part until it is completely loaded	Load will be done with the settings of load environment
02	Update Duration	This is the time needed to run update actions at your part	Update feature Update Drawing views Update structure
03	CheckBox extract duration	This is the time NXCheckBox needs to read the CheckBox data from parts and write it into CbeckBox.xml file	NO
04	Entire Duration	Is the total amount of Load-, Update- and CheckBox extract- duration	NO

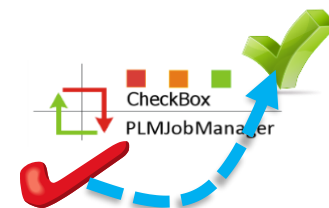
Performance measurement



	Last saved with	NX version	TC@PLMRF	Load options
Case 1	NX10	NX10.0.3.5 MP18 / 18.1a / NX10_d	TC11.2.4.41 / 18.1.0.3 / SVN 50742	Partially Load - Lightweight display - WAVE at levels
Case 2	NX10	NX12.0.2.7 EAP / NX12_eap	TC11.2.4.41 / 18.1.0.3 / SVN 50742	Partially Load - Lightweight display - WAVE at levels
Case 3	NX10	NX12.0.2.9 MP0 / 18.2a / NX12_c	TC11.4.0.4 / 18.2.1.1-SNAPSHOT	Partially Load - Lightweight display - WAVE at levels
Case 4	NX12	NX12.0.2.9 MP0 / 18.2a / NX12_c	TC11.4.0.4 / 18.2.1.1-SNAPSHOT	Partially Load - Lightweight display - WAVE at levels

Benefits for using NXCheckBox

- ✓ **Getting overview about NX – TC Software Quality**
- ✓ **Getting overview about your NX - TC Data Quality**
- ✓ **Helps to setup NX - TC customer settings**
- ✓ **Helps to find issues before designers working with the new NX – TC Version**
- ✓ **Helps to keep the value of PLM Data**
- ✓ **Reduces cost's “after upgrade” because Data and software issues can be better identified and solved before upgrade.**
- ✓ **Reduces Upgrade risks**



Introduction NXCheckBox Involved Company's

The CheckBox Software is developed by Mr, Bernd Schieber (SISW Stuttgart).
 Software specification, project coordination and PLMJobManager integration was done by Mr. Josef Feuerstein (addPLM)

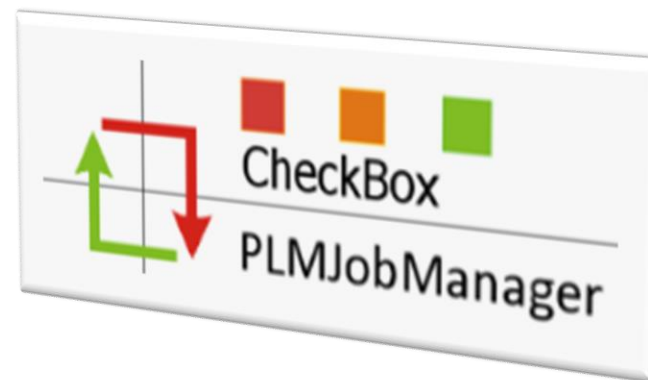
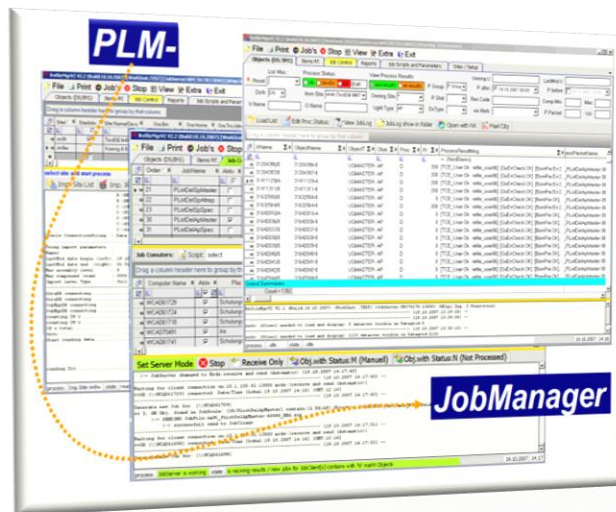
All Company's did spend 3 Day's of Services to SISW.

At the Meeting (on 28.04.2010) the participants' agreed that it is possible for another company to join this Project. To take part in this Project the new company has also to spend 4 Day's of Services on this project.

Info: The PLMJobManager Software is a separated Software and is not Part of the CheckBox Tool.



System requirements



JobServer:

- Win10 Workstation
- W2008 .. W2019 Server



JobClient:

- Win10 Workstation
- W2008 .. W2019 Server
- with Full NX- und TC- installation