BMW Group
Assembly Technology

DMU Delivery Instructions

CAD-Documentation Assembly Technology

Version	**v1.1**
Date	11 Jan. 2010
Status	**released**
Author	Florian Harnatt
Filing	BMW Partner Portal (https:///b2b.bmw.com) at Public Area > Departments > Technologies > Assembly > Production tooling and fixtures

Change history

Version	Date	Author	Description
v1.1	11 Jan.2010	F. Harnatt, TP-40	Translation of German document

Inhaltsverzeichnis

1 Background information and classification

- In the assembly technology, the CAD-system CATIA V5 is used for designing tools and production equipment. There are further BMW-specific software tools in use for data management, PDM connection, parts list generation, etc. such as Prisma, CARISMA, FM-Stüli, etc.
- The contractor must keep all regulations and use the specified software when processing an order in connection with CAD-design and documentation. These regulations and software requirements are available in the BMW Partner Portal (https://b2b.bmw.com) in the following section: Public Area > Departments > Technologies > Assembly > Production tools and fixtures
- The contractor is obligated to use the software versions valid at BMW at the time of order placement in order to fulfill the CAD design and documentation requirements. It is the contractor's responsibility to retrieve the current information from the BMW Partner Portal.
- Requirements regarding documentation within the tool design scope are defined by the CAD-Documentation-Specification (see BMW Partner Portal at Public Area > Departments > Technologies > Assembly).
  There are different requirements depending on the type of production equipment ordered:
  - Design-Quality: refers to the complete package of design data according to **OEM-Guideline and BMW specific supplement** (3D-design created originally in Catia with CARISMA, associative drawings and parts list).
  - DMU-Quality: refers to the 3D-DMU-Model in Catia V5 file format (converted data is acceptable) incl. assembly-drawing, replacement and wearing parts list as described in the **DMU-Delivery Instruction** (this document).
  - Layout: refers to the 2D-Layout created with MicroStation in DGN file format for the illustration of the on-site situation. The illustration is to include essential characteristics regarding installation space and the recommended integration into the existing or planned production setting according to **Delivery Instructions CAD-Layoutplanning**.

2 Provision of data by the purchaser

2.1 Data format

- The 3D data of automobile components and production equipment required for tool design will be supplied (if available) exclusively as Catia V4 or Catia V5 data in the file formats CATProduct, CATPart, CGR or Model.
- The file format of the supplied data depends on the Catia software releases currently used by BMW. Information concerning this matter as well as the announcement of release changes are provided in the BMW Partner Portal (https://b2b.bmw.com) at Departments > Development > Applications.
- There are specific regulations for the documentation of changes (see chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**).

2.2 Data exchange

- The data exchange is to be carried out via OFTP file transfer (ODETTE File Transfer Protocol) as a zip-compressed archive.
- The contractor is required to set up an OFTP data link for data exchange. If the contractor does not have an OFTP software and infrastructure at his disposal, the data exchange can be carried out via web-connection with BMW's OFTP software "OpenDXM for Partners" found in the BMW Partner Portal.

3 Scope of delivery

For hand-off acceptance, the contractor must supply the complete scope described in the following chapters. For design reviews, only the newest version of the 3D-model needs to be provided.

The contractor must also provide a proposal for replacement and wearing parts on the basis of the 3D-model and assembly drawings. This information is required before approval for manufacturing. The delivery scope for single part drawings for replacement and wearing parts will be defined in conjunction with the responsible BMW maintenance planning team (see chapter 3.2).

If the scope of delivery is particularly large or complex, the contractor is to discuss with the mentoring BMW tool design team whether a single or several models are required.

3.1 3D-DMU-Model

- The 3D-model must include the complete and correct geometry of all tools within the delivery scope.
  The on-site situation at BMW must be considered because all modifications or adjustments during build-up or commissioning must be represented correctly in the 3D-model (e.g. mounting position of single components, length-adjustments, etc.).
- Standard and repeat parts such as screws, nuts, washers, fitting keys, etc. do not have to be represented in the 3D-model, as long as they are not relevant for interference or narrow points.
- The structure of the 3D-model must be designed in such a manner that moveable parts (sub-assemblies connected by linear bearings, swivel units, etc.), are modelled separately (at least as separate bodies in an ALLCATPart).
  E.g.: Two components connected by a linear bearing are not modelled as one solid but as a minimum of two components, so that their relative movement to each other can be simulated.
- Colouring in the 3D-model of individual components or the complete tool is not to be done using red (red colour in Catia V5 implies that the respective element is not up-to-date and needs an update).
- The 3D-model must be in correct position relative to the car components (mounted in the correct position in the car). The position of the car components supplied by BMW may not be changed in any way.
- The 3D-model must always be designed in the operating position. If there are several possible operating positions, which positions are to be modelled is to be discussed with the mentoring tool design team of the purchaser (e.g. because of mounting several car components, different usage sites or usage for different car models).
- If the resting position or intermediate positions are relevant for collision analysis of the tool, then separate models are to be supplied as determined by discussion with the purchaser.
- If multiple working, intermediate or resting positions of the tool are relevant, each position is to be delivered as a separate model.
  Exception: If the difference between the positions is only characterized by single components (e.g. opened or closed clamp) a single model can be deliv-

ered, wherein the not-working position is shown as being transparent (e.g. an open clamp would be transparent).

3.2 Assembly and single part drawings

- Delivered drawings must be complete and consistent with the 3D-model.
- Assembly drawings, including labels for replacement and wearing parts and assembly dimensions, must be delivered for the complete scope of delivery.
- Standard and repeat parts like screws, nuts, washers, fitting keys, etc. are to be indicated in the assembly drawing at the respective places of installation.
- Single part drawings must be delivered for replacement and wear parts for approval as agreed to with the responsible BMW maintenance planning team (see preamble in chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- Drawings must be created according to the BMW Production Equipment Specification Documentation (see BMW Partner Portal).
- The BMW drawing title block in the lower right corner of each drawing sheet must be completely filled in (first sheet with main title block, following sheets with following title block). Drawing views of single parts have to be labelled with a BMW single part title block.
  Templates for title blocks and drawing frames are available in the BMW Partner Portal for downloading.
- Single part drawings must not be displayed on the same sheet as assembly drawings (single part drawings are to be on sheets separate from the assembly drawing).Background: If changes to the assembly drawing are necessary, it generally needs to be re-created from scratch. However, the single part drawings can be copied if the respective part has not changed. Copying single part drawings is not possible within PDF documents if the assembly and single part drawings are on the same page.
- The contractor may use the upper left corner for internal use, if so desired.

3.3 Replacement and wearing parts list

- The delivered replacement and wear parts list must be complete and consistent with the 3D-model.
- All purchased parts must be listed completely along with original manufacturer, type, and article number of the original manufacturer.

4 Provision of data by the contractor

4.1 Data format

- The 3D-model is to be provided exclusively in the Catia V5 file formats CAT-Part and CATProduct. All geometries must be supplied as solids (no faces, volumes, etc.).
- The 3D-model can be supplied as either a single document (ALLCATPart) or, preferably, in the form of multiple documents (CATProduct with multiple Sub-CATProducts, Components and CATParts).
- The conversion of the 3D data from other CAD-systems is allowed, but must be converted by the contractor. The contractor must assure that the converted data is error-free, complete, and that the supplied 3D-model is identical to the delivered tool.
- The 3D-modell (All.CATPart or root-CATProduct) must comply with the following naming convention:
  5123456__B__1__A__Tool-Name.CATPart
  The different name components are to be separated by two underscores and are defined as follows:
  - 7-digit part number, here „5123456“: will be supplied by BMW
  - Version Index, here „B“:
    Always starts with index A and will be increased after geometrical changes as discussed with the purchaser. Valid values: A to ZZ.
  - Document Part, here „1“:
    Counter from 1 to 99 e.g. for differentiating several positions (working positions, resting position, etc.).
  - Document Alternative, here „A“:
    If there are multiple design alternatives, then several approaches should be designed and delivered. Valid values: A to J.
  - Tool Name:
    Name for the tool. Will be assigned by the purchaser. Maximum of 40 characters and only alphanumeric, minus, and underscore characters.

- The complete set of drawings must be delivered as a single PDF-document. Correct page orientation (portrait or landscape format) has to be assured for each page.
- The replacement and wear parts list must be delivered as an original Excel file and additionally as a PDF-document. The template is provided for download in the BMW Partner Portal.
- The drawing and the replacement and wear parts list must comply with the naming convention for production equipment of the DZA (Digitales Zeichnungsarchiv = digital drawing archive):
  F_5123456_001_B_090610.pdf
  The different name components have to be separated by a single underscore and are defined as follows::
  - Standard prefix „F“ for tooling (“Fertigungsmittel”, German word for ‘tool’)
  - 7-digit part number, here „5123456“: will be supplied by BMW
  - Sheet number, here „001“: Drawings are to be saved as 001, replacement and wear parts list as 099.
  - Version-Index, here „B“: see above
  - Date, here 090610:
    Delivery date in format YYMMDD, here June 10th, 2009
- Additional documentation (e.g. supplier data sheets of used purchased parts) must be supplied as PDF-documents. The DZA naming convention for production equipment additions has to be applied:
  F_ZD5123456_001_A_090610.pdf
  the different name components are defined above, the part number has to be supplemented with the prefix “ZD” (“Zusatzdokumente”, German word for ‘additions’).
- All files must be saved in a single zip-archive. The zip file name follws the same convention as the 3D-model file name but with file extension “.zip”:
  5123456__B__1__A__Tool-Name.zip

4.2 Data exchange

Data exchange is handled via OFTP (see chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**).

5 Documentation of changes

As a rule, all regulations defined in this delivery instruction are valid for both newly created designs and for design changes. Requirements in the BMW Production Equipment Specification Documentation have to complied with when changing existing documents.

The documentation supplied by BMW provides a basis for the change documentation and may therefore deviate from the description in chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**, depending on availability and the original method of data creation. If required, details are to be clarified by the contractor before submitting an offer.

The descriptions in the following chapters specify the generic approach for the different delivery scopes.

5.1 3D-DMU-Model

As the data supplied by BMW only consists of solid bodies and does not contain any detail design information, a direct change of the affected geometry is generally not possible (this depends on the change, which CAD-system is used, etc.).

This means that the changed elements must be deleted and designed new from the bottom up to include the changes. The newly designed elements then have to be (re-) integrated into the existing model of the tool.

The contractor is required to deliver a complete 3D-DMU-model as a final result, as described in chapters 3.1 and 4.

5.2 Assembly and single part drawings

Depending on availability and the way the original data was created, drawings of the existing data will be supplied by BMW in one of the following file formats: Catia V4 model, Catia V5 CATDrawing, PDF or TIFF.

If BMW supplies the drawings as described in these delivery instructions as PDF files (or TIFF for elder data), it is generally necessary that assembly drawings be re-done based on the updated 3D-model. If replacement and wear parts were not changed, then the corresponding pages can be copied without making additional changes.

The contractor is required to supply a complete set of drawings as a single PDF-document as described in chapters 3.2 and 4.

Note: Single pages of PDF-documents can be extracted and rearranged into new documents using the appropriate software. E.g. free Open Source software pdfsam (PDF Split and Merge). Alternatively, change notes can be added directly in the PDF-document using the appropriate software (e.g. Adobe Acrobat, Tracker PDF XChange, etc.).

5.3 Replacement and wearing parts list

The Replacement and wear parts list, or the bill of material, for existing data will be supplied by BMW in FM-Stüli XML file format or as an Excel document (depending on data availability).

Changes are to be documented in the respective file format in accordance with chapters 3.3 and 0.