



**Westland Helicopters Ltd**

**Digital Product Definition  
Quality Requirements for Suppliers**

**QAS 100 Issue 5**

For WHL:

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### AMENDMENT RECORD

<b>Issue Number</b>	<b>Date of Issue</b>	<b>Reason for Amendment</b>
Issue 1	November 2004	Initial Issue
Issue 2	October 2005	Re-write and Formally Released at Issue 2.
Issue 3	September 2008	QAS100 take on by SQA – amendments highlighted by change bars
Issue 4	April 2009	Amendment to 10.2 Inspection Plan – remove (g) A copy of the approved Inspection Plan shall be attached to the Certificate of Conformity for each product delivery to WHL. For assemblies, the Supplier shall only attach the Inspection Plan for the Assembly; lower level Inspection Plans for detail parts shall be retained by the Supplier  Minor amendment to 10.3 First Article Inspection Report FAIR
Issue 5	February 2011	Re-write and formally released at Issue 5

## 1. Purpose

This document defines the minimum requirements for a Supplier's Digital Product Definition (DPD) Process to receive, manufacture and certify compliance to a WHL supplied Design Data Set (DDS) as opposed to traditional 2D drawings.

## 2. Scope

This requirements document is associated to QRS01 (AgustaWestland Quality Requirements for Suppliers) and is scoped specifically to authorise Suppliers to manufacture from a WHL Digital Product (DP) CATIA V4 Design Data Set (DDS).

QAS100 is applicable to all Parts designed for WHL DP programmes.

DP manufacture includes but is not limited to:

- Castings and Forgings
- Tooling
- Sheet Metal Fabrication and Metallic Structures
- Metallic Component Parts and Mechanical Assemblies
- Composite Components and Structures
- Electrical Looms and Electrical Assemblies

Design responsibilities and activities are not scoped into this document, although there is a dependency on e.g. Manufacturing Engineering, to understand and operate CATIA V5 to read and extract design data for Manufacturing and Inspection purposes.

Adherence to this document is mandatory for all phases of manufacture and inspection where WHL Sealed Data Transfer is used to produce Products or digital data in support of Product acceptance.

WHL shall document and communicate compliance to QAS 100 requirements within the Supplier's Scope of Approval.

Refer to Figure 1 for an overview of QAS 100 which identifies concurrent activities for both the Supplier and internal to WHL.

The single point of contact for information pertaining to this document is the Supplier Quality Assurance (SQA) Department.

## 3. Acronyms & Definitions

### Authority / Authoritative Data

Undisputed source of WHL approved type design used for Product manufacture and Quality Assurance acceptance without any form of change, subject to access control and configuration management by the Supplier.

### CAD - Computer Aided Design

(1) Any computer system or program that supports the design process. (2) The use of computers to assist Engineering Design in developing, producing, and evaluating design, data and drawings.

**CAE - Computer Aided Engineering**

The use of computers to develop Engineering data to supplement Engineering Designs, used in Product production and inspection.

**CAM - Computer Aided Manufacturing**

Also known as Numerical Control (NC). The use of computers and computer data in the development and production of a part (Product) including fabrication, assembly, and installation.

**CATIA - Computer Aided Three-dimensional Interactive Application**

2-D and 3-D integrated Product life-cycle design package.

**CMS - Co-ordinate Measurement Systems**

Also known as Computer Aided Inspection (CAI) and Computer Aided Measurement Systems (CAMS). Measurement equipment such as Co-ordinate Measuring Machines (CMM), Laser Tracker, and Numerical Controlled machinery with inspection probe capability which are used to support inspection activity.

**DDS - DESIGN DATA SET**

The set of digital data which completely defines a part or assembly and is used to transfer this information to other users (Manufacturing, Quality, Suppliers, Maintainers, Customers). A DDS includes, but is not limited to, Part lists, Bill of Material, Design notes, exact 3D geometry and a minimum number of 2D drawings, documents, data files, etc. The Dataset will contain F, D & T data either in the Model or in 2D format.

3D models and 2D drawings are in CATIA V4 format.

**DPD - Digital Product Definition**

The electronic data elements that specify the geometry and all design requirements for a Product (including notation and parts lists), and the use of this data throughout an integrated CAD / CAM and CMS system.

**DPSDP – Digital Product Sealed Data Plan**

A formal document describing the requirements for management of digital data and DPD processes throughout a supplier's production facility.

**FAIR – First Article Inspection Report**

Documentation for a part number or assembly, including FAI results.

**FEATURE**

Any hardware design attribute or characteristic. This includes physical portions of hardware such as a surface, face, edge, radius, hole, tab, slot, pin etc and requirements such as Non-Destructive Inspection and Inter-changeability and Replaceability. All features require validation to certify the Product to the design authority. All features have associated notes and / or Geometric Dimensioning / Tolerancing Feature Control Frames (FCF). One note or FCF may refer to several features e.g. use of general manufacturing, tolerance for undimensional features.

**F, D & T**

CATIA V4 Functional Dimensioning and Tolerancing.

**ICT**

AW Information Communication & Technology Department (UK).

**IGES / STEP - Initial Graphics Exchange Specification**

The American National Standards Institute (ANSI) Data standard for the exchange of computer graphics generated Product definition (no solids) between different manufacturers CAD / CAM systems. STEP is the ISO sponsored preferred successor to IGES capable of solid model transfer.

## **INSPECTION PLAN**

A plan describing inspection requirements for data extracted from the DDS.

## **INSPECTION PLANNING**

A description of 2D and / or 3D computer generated inspection media / methods, derived from authoritative DDS, used to communicate inspection requirements to manufacturing and inspection areas. Typical inspection plans include dimensional Engineering and as-planned configuration / traceability, overlay / set-up instructions, and a list and / or graphic representation of the features to be inspected.

## **LEV - Lower End Viewer**

An entry level, visualisation system (e.g. Enovia 3D com) used to view and print dimensional and other required data from the DDS as annotated by WHL.

## **PRODUCT**

A general term used for Hardware, Software, Material, Jigs, Fixtures, Tooling, Measuring Equipment, Test Hardware and Software.

## **PRIME SUPPLIER**

A Supplier receiving a WHL Contract / Purchase Order.

## **SEALED DATA TRANSFER**

A term used to describe the movement, transmission, exchange, validation, conversion and storage of data, transferred to and from a WHL Supplier, for which the integrity of the data is sealed and therefore no change is permitted.

## **SFTP**

WHL Secure File Transfer Protocol

## **STEP**

Standard for The Exchange of Product data

## **SUB-TIER SUPPLIER**

A Supplier receiving a Contract / Purchase Order from a Prime Supplier in furtherance of a WHL Contract / Purchase Order.

**VPM** - Virtual Product Modeller

## **WHL / Company**

Westland Helicopters Ltd, an AgustaWestland (AW) Company.

## **WHL Native CATIA**

WHL DDS transferred to a Supplier without being subject to amendment, corruption or interpretation.

## 4. Applicable Documents

Document	Title
QRS01	AgustaWestland Quality Requirements for Suppliers
WHPS700	Control Procedure for Vital and Identifiable Parts
SQA20	First Article Inspection Requirements
ICT000475	DP CATIA V5 Requirements for External Subcontract Suppliers
ER029	Graduated Tolerancing of 2D Drawings & General Manufacturing Tolerances for 2D & 3D Model Definitions
MDS1000	I.S.O. Metric Limits Fits and Tolerances - Standard

## 5. Requirements

### 5.1 Supplier Methodologies

The Supplier is required to generate processes and procedures demonstrating compliance to QAS100. These procedures shall be referenced in a dedicated Digital Product Sealed Data Plan (DPSDP).

Manufacture may commence in advance of approval only with the written authority of WHL SQA i.e. in accordance with a documented and time-bound closure plan leading to a minimum level of approval.

See Appendix A for a schematic of Digital Product Sealed Data Transfer Process for manufacture and Inspection purposes.

### 5.2 Stage Implementation to QAS 100 Approval

Referring to Figure 1, ideally Stages 1 to 4 shall be implemented concurrently by WHL working with the Supplier over an agreed timescale.

### 5.3 Requirements for the Supplier's Information System Tools

- a) The Supplier shall operate and maintain the minimum specification for hardware, software CATIA V5 level and operating system as defined in ICT000475 to achieve technical compatibility with WHL.

Where the supplier is unsure of their compliance to WHL's minimum specification, the Supplier shall obtain confirmation from either Dassault Systemes or their Dassault Systemes approved service provider of the suitability of their proposed hardware and software solution in order to remain compliant to WHL's specification. This confirmation shall be formally documented and provided to WHL SQA.

The Supplier shall document within the DPSDP their current level of hardware, software and other digital system information. This includes CAD, data exchange and other computing equipment that receives authoritative data.

- b) Where the Supplier chooses not to operate CATIA V5 and subject to WHL acceptance of the Supplier's proposed system solution, the Supplier shall be required to complete a specific number of Data Transfer Tests with WHL ICT Department (termed the ICT Connectivity Test). The Tests will be determined from the proposed Supplier scope of approval.

The Supplier shall provide notification to the WHL ICT Department of their current hardware and software configuration.

Following the successful outcome of the ICT Connectivity Test, the Supplier shall comply fully with any conditions of the WHL authority to proceed.

- c) For any changes to ICT000475 and / or the Supplier's CAD system, the Supplier shall revise and submit their DPSPD to WHL for re-approval quoting changes to their hardware and software configuration.

The supplier shall be responsible for maintaining compliancy with WHL's hardware and software requirements in accordance with the requirements of Para 5.3 (a) shall apply.

- d) For the requirements appertaining to Suppliers transferring DDS to their lower tier Suppliers, refer to Para. 6.6.

## **6. Digital Product Sealed Data Plan (DPSPD) Content.**

Refer to Appendix B for a summary of Digital Product Sealed Data Plan (DPSPD) contents.

- 6.1 The Supplier shall develop and maintain a DPSPD which documents the controls specific to processing Sealed Data Transfer. The DPSPD shall be approved by WHL SQA approval, prior to the commencement of manufacture.
- 6.2 The Supplier shall include a process flow showing their DPD process for DDS receipt, storage, and validation with a representation of associated Manufacturing Engineering, Production and Inspection DDS processes.
- 6.3 The Supplier shall document within their DPSPD their hardware, software CATIA V5 level and operating system status, complete with each applicable revision status, as required to achieve technical compatibility with WHL Sealed Data Transfer in accordance with ICT000475.

This shall include:

- a) CAD packages and any additional computing equipment receiving Authoritative Data.
  - b) The method of accessing and processing DDS's by each function of the Organisation.
- 6.3 The Supplier's DPSPD shall include a reference to any existing DPD processes compliant to QAS100 or alternatively directly call up new QAS100 procedures for e.g.:
    - a) Manufacturing Engineering
    - b) Engineering Standards e.g. ER029 / MDS 1000 Graduated Tolerancing
    - c) Configuration Management
    - d) Inspection Planning
    - e) First Article Inspection
    - f) Steady state batch Inspection
    - g) Digital Product Training
  - 6.4 The Supplier's DPSPD shall describe a single Configuration Management process that meets the requirements of Para. 7.



- 6.5 The Supplier shall conduct periodic Internal Audits against the DPSPD to ensure continued compliance and effectiveness of the documentation and processes. Results of these Internal Audits shall be documented and maintained for review by WHL.
- 6.6 When there is an intention for a WHL Prime Supplier to sub-contract WHL DDS to a Sub-Tier Supplier in furtherance of a WHL DP Purchase Order, the Prime Supplier shall be responsible for :-
- a) Ensuring the Sub-Tier Supplier is approved, by WHL, to QRS01 prior to any Purchase Order being placed.
  - b) Ensuring the Sub-Tier Supplier is approved to QAS 100 requirements.
  - c) Approving the Sub-Tier Supplier's DPSPD.
  - d) Listing the Sub-Tier Supplier in their DPSPD.
  - e) Ensuring the Sub-Tier Supplier complies with the minimum specification for hardware, software CATIA V5 level and operating system as defined in ICT000475.
  - f) Technically validating the integrity of the original DDS during any transfer to the Sub-Tier Supplier.
  - g) Sealed Data Transfer of the WHL DDS to the Sub-Tier Supplier.
  - h) Ensuring DDS transfer to the Sub-Tier Supplier does not take place in circumstances stipulated by WHL, when applicable.

Note - These requirements are not valid if full 2D hard copy Design definitions are generated and configured by the Supplier from the WHL DDS and provided to the Sub-Tier Supplier.

- 6.7 The Supplier shall provide prior notification to WHL SQA of any change that directly affects the approved content of the DPSPD. Similarly, the Supplier shall update their DPSPD against any up-issues of QAS100, or on the specific request of WHL and resubmit their DPSPD to WHL SQA for re-approval.

## **7. Configuration Management and Data Security**

Throughout the manufacturing & inspection process, the supplier shall maintain procedures and processes in order to ensure the correct configuration of the Product Baseline and to maintain data integrity and traceability of each Product back to the WHL Sealed Data Transfer and all of the associated DDS elements from WHL.

The following controls shall be documented within the Supplier's DPSPD:

- 7.1 The documented method of receiving and retaining the integrity of the original definition contained in Sealed Data Transfers from WHL and any associated hard copy documentation.
- 7.2 Configuration and traceability of the physical Product, In Process Models, Manufacturing Engineering and Inspection Planning back to the original WHL DDS and associated specifications, data and procedures.
- 7.3 Authorisation from WHL to use any non-released DDSs, ensuring identification and control in accordance with Para. 8.
- 7.4 Recording of the version number of the WHL CATIA DDS (the version number of the model is identified with the first 3 characters following the Part Number, subject to leading zeros / blanks).
- 7.5 Any DDS transferred from WHL identified as "REFERENCE ONLY" (stating this shall not be used for production purposes).

- 7.6 Product compliance to the WHL Sealed Data Transfer. This shall be underwritten by, and be traceable to, the FAIR in accordance with QRS01.
- 7.7 Recording of all data and DDS transmittals, to and from WHL. This shall be traceable to the Supplier's CAD software and authorised users.
- 7.8 The Supplier's DPSDP specific validation processes for any exchange, translation or conversion of the original WHL DDS, i.e. solely for manufacturing or inspection purposes, to ensure the original Design intent is retained with no risk of change or data corruption - refer to Appendix A.
- 7.9 Secure storage of WHL Sealed Data Transfer and the Supplier's own CAD / CAM models. Access shall be controlled and restricted to authorised personnel only.
- 7.10 Secure data backup system and disaster recovery process.

## **8. WHL Data Maturity**

The Supplier is authorised to manufacture and release Products that are produced and traceable to fully released WHL DDS i.e. at the 100% maturity status of RELEASED 'R'.

Controlled exceptions may take place only when WHL explicitly authorise the manufacture from a Design prior to release for a specified purpose. WHL controls shall take into account any restrictions imposed by the current maturity status.

When applicable, prior to WHL Design release, the Supplier shall apply the following concerning the receipt and control of a WHL DDS :

- 8.1 A 'non-released' DDS shall not be used without formal authorisation by WHL.
- 8.2 Products shall be securely and temporarily identified as 'non conforming' and segregated accordingly.
- 8.3 The Supplier's Configuration Management system shall provide traceability to the WHL formal 'authorisation-to- proceed' with any corresponding WHL manufacturing instructions and restrictions.
- 8.4 All manufacturing instructions and restrictions imposed by WHL shall be invoked.
- 8.5 Products manufactured from a 'non-released' DDS shall only be dispatched to WHL under the authorisation and controls imposed by WHL, e.g. endorsement of the Certificate of Conformity "not for ground run or flight" with corresponding identification / labelling of the Part i.e. colour banding in accordance with QRS01.

## **9. Inspection Methods and Planning**

A WHL DDS holds an infinite number of dimensions which may be extracted by a CATIA user. With respect to annotations or 'dimensioning' of explicit dimensions created by the WHL Designer:

- By definition, features subject to a defined tolerance shall have the dimension and tolerance annotated by WHL Design on the specific feature of the DDS. i.e. 'Explicit Dimension'.

- A dimension and tolerance not explicitly annotated on a feature by WHL Design is termed an 'Implicit Dimension'.
- General tolerancing shall be in accordance with the Engineering Standard called up by the Design e.g. ER029 / MDS 1000 etc

In furtherance of the above, the Supplier is required to produce an Inspection Plan to enable the Product definition in its entirety to be inspected and certified. The Inspection Plan shall consist of all explicit dimensions annotated on the WHL Design plus any additional implicit dimensions required by the Supplier for manufacturing and inspection purposes.

The explicit and implicit dimensions and Design Notes shall be extracted from the WHL DDS for manufacturing and inspection purposes using the standard CATIA toolset.

**In all cases there shall be no form of interpretation or change of definition.**

Any emerging anomalies shall be formally raised with WHL with a record of close-out including traceability to the WHL response.

The retention of 3D definitions via electronic work instructions is encouraged by WHL for Inspection Plans.

A LEV may be used to create 2D sketches / views for design data to manufacturing and inspection as required.

To ensure Products are inspected against original source data, the original WHL Sealed Data Transfer should be used directly for inspection purposes, e.g. CMM or Laser Tracking.

Where there is a need for data to be converted for Inspection purposes, this shall only be permitted under the controls specified in the approved DPSPD; ref. Para 6.

## 9.1 Inspection Plan

The Supplier shall produce an Inspection Plan for each detail part (and / or assembly) to enable the Product definition in its entirety to be inspected and certified.

- a) The Inspection Plan shall identify all of the features, dimensions and tolerances annotated on the DDS plus any additional features, not annotated on the DDS, required to retain and verify the Design intent for manufacturing and inspection purposes. The Inspection Plan shall include all Design Notes.
- b) The Inspection Plan shall be directly traceable to the original WHL native CATIA DDS and shall include reference to the DDS.
- c) The dimensional inspection requirements and Design Notes shall be extracted from the original WHL DDS by competent personal trained in CATIA V5 using the standard CATIA toolset without interpretation or change. Any resulting queries shall be formally recorded and resolved directly with WHL.
- d) Traceability of inspection results back to the original WHL Sealed Data Transfer is required in all cases.
- e) The Inspection Plan shall be subject to independent vetting and approval by the Supplier's Quality Organisation. This role may be delegated by Quality, in accordance with the Supplier's governing procedures, to a competently trained position within the Organisation, e.g. within Manufacturing Engineering
- f) It is essential to use WHL native CATIA throughout, in particular for CMM inspection purposes.

- g) The Inspection Plan including issue status shall be recorded on the supporting manufacturing routing documentation.
- h) For parts with a Design Category of Vital or Category F, the Inspection Plan shall be submitted as part of the Manufacturing Process Layout and subject to WHL approval prior to the commencement of manufacture. The requirements of WHL document WHPS 700 shall apply.

## **9.2 First Article Inspection Report FAIR**

FAIR requirements as defined within QRS01 and SQA20 shall apply.

All FAIRs shall include the applicable Inspection Plan, which shall subsequently be used for steady state batch production / inspection purposes.

Actual measured dimensions shall be recorded on the approved Inspection Plan for FAIR purposes, but do not need to be recorded in steady state production.

FAIR and batch inspection results shall be traceable to the requirements of the Inspection Plan.

For example, CMM programming, CMM reports and bench inspection requirements shall originate from the Inspection Plan.

## **10. Technical Problem Reporting and Corrective Action**

10.1 The Supplier shall ensure that any irregular or non-conforming Sealed Data Transfers are formally identified to WHL as discrepant, quarantined from use and reviewed for disposition.

10.2 The Supplier shall develop and maintain procedures for reporting, tracking and resolving any data transfer, hardware, software and DDS issues.

10.3 For general issues relating to CATIA, the supplier shall consult Dassault Systemes or their Dassault Systemes approved service provider.

## **11. Ongoing WHL Approval of the Supplier**

Following approval to QAS100, WHL reserves the right to periodically audit the Supplier's ongoing compliance to QAS100.

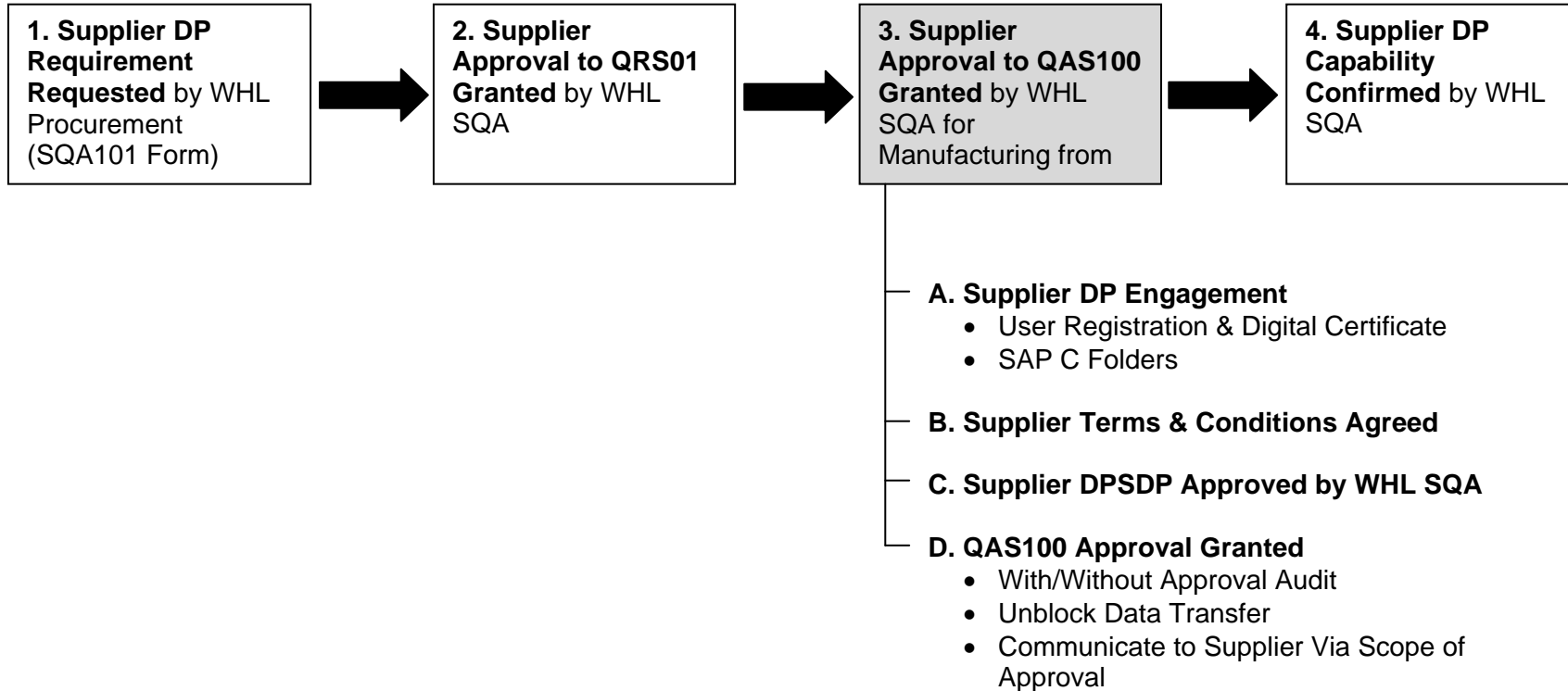
## **12. Training Requirements**

Regular training 'needs and analysis' shall be conducted for all functions to achieve and maintain minimum competency levels against QAS100 requirements. Associated training records shall be updated and maintained for this topic.

Refer to Appendix C for minimum training guidelines.

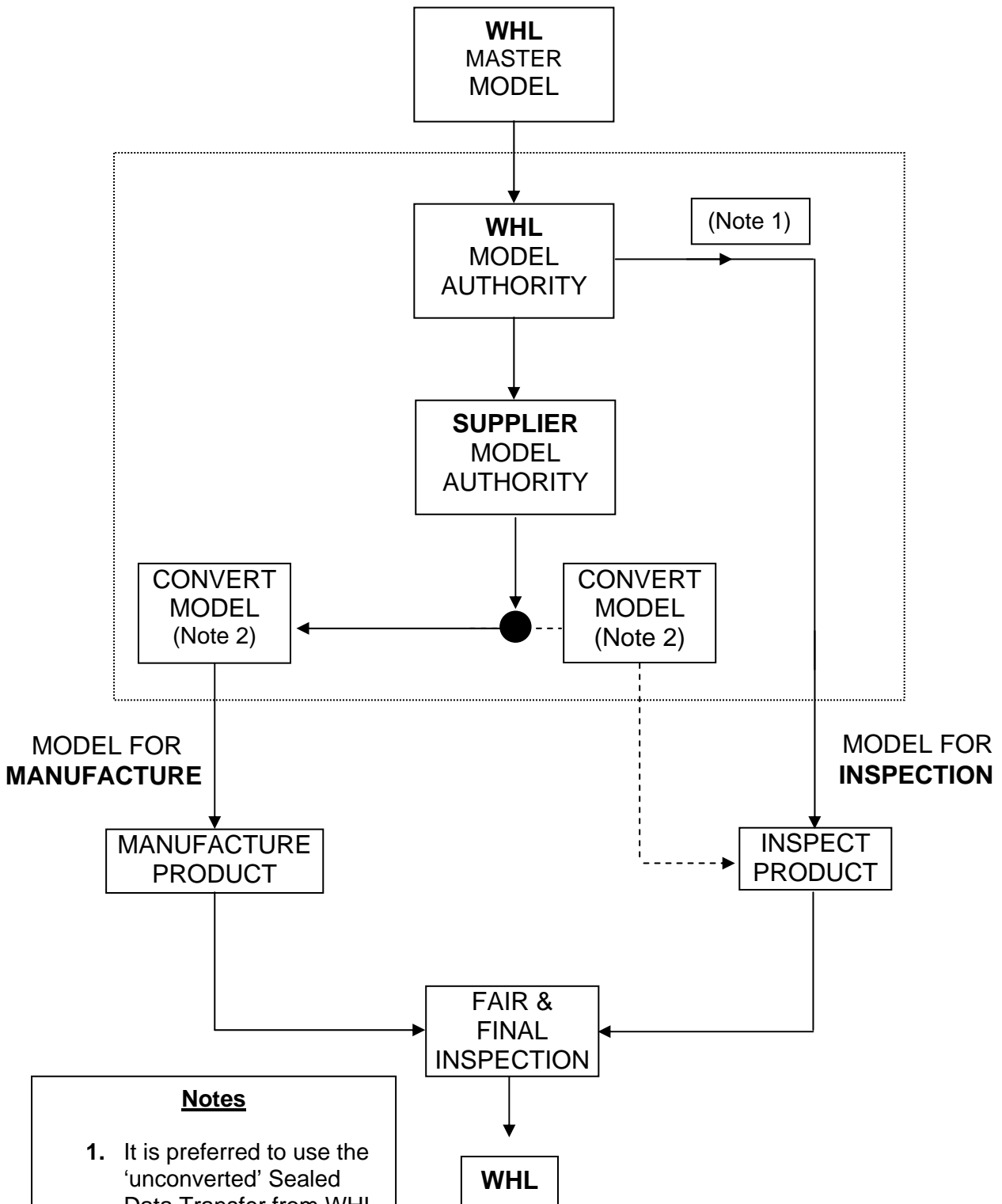
## Figure 1 - QAS 100 PROCESS OVERVIEW

### Digital Product Enabling Process



# APPENDIX A

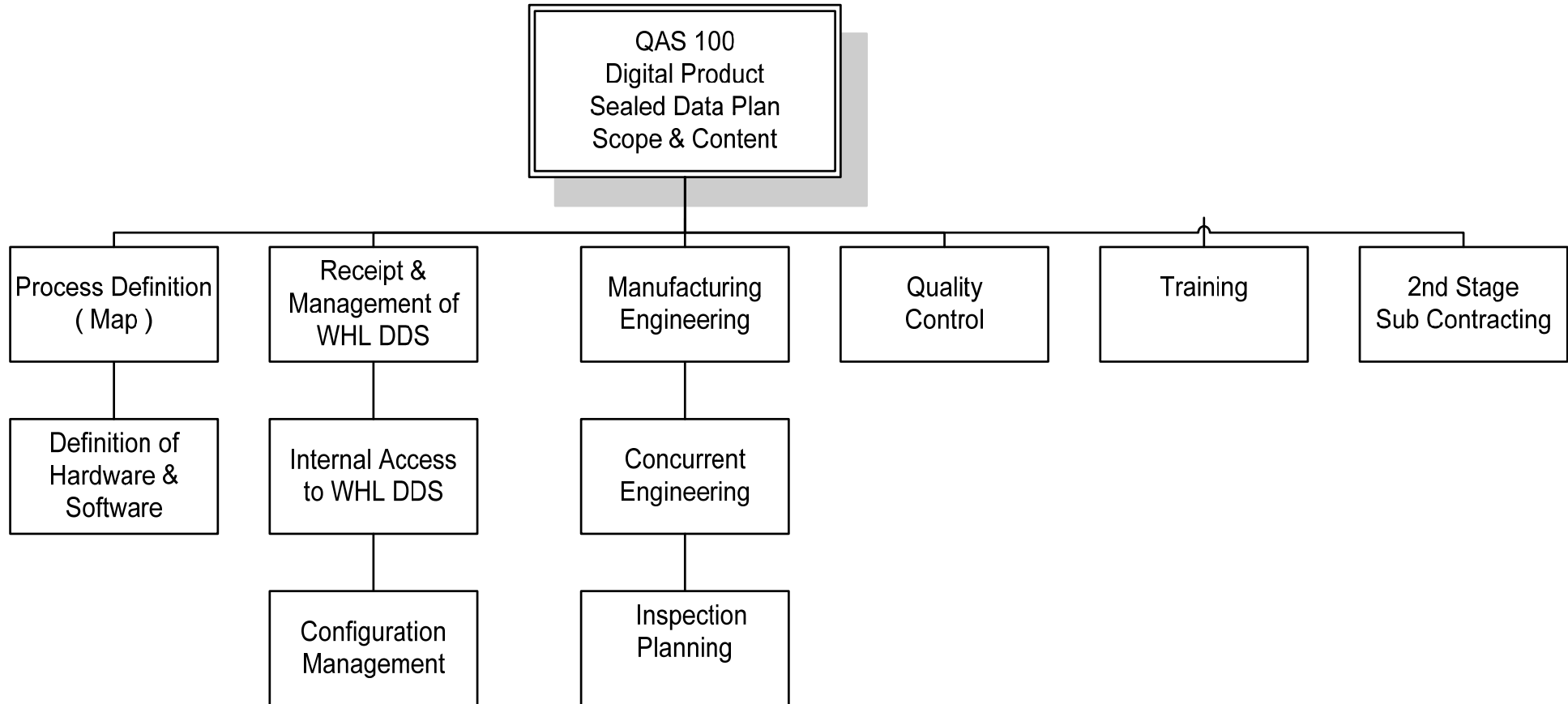
## Digital Product Sealed Data Transfer Process



- Notes**
1. It is preferred to use the 'unconverted' Sealed Data Transfer from WHL for Inspection purposes.
  2. Validation of all data exchanges, translations or conversions shall be performed.

## APPENDIX B

### Digital Product Sealed Data Plan Scope and Content



## APPENDIX C

### Guidelines for Minimum Training Requirements for CATIA & Digital Product

#	FUNCTION & DEPARTMENT	TOPIC & TRAINING REQUIREMENT	TRAINING SOURCE
1	<b><u>Inspection Planning</u></b> Manufacturing Engineering & Quality Control	<p style="text-align: center;"><b><u>CATIA V5</u></b></p> <p>Extracting the Design Definition from the WHL DDS including Implicit Dimensions for Manufacturing &amp; Inspection Purposes</p> <p>Includes Inspection Planning for CMM programming (where applicable).</p>	Dassault Systemes or a formal DS Service Provider.
2	<b><u>Remaining Support Functions</u></b> e.g. QA, QC, SQA,	<p style="text-align: center;"><b><u>CATIA Low End Viewer, LEV</u></b></p> <p style="text-align: center;">Viewing the WHL DDS</p>	The LEV Provider or a formal Service Provider.
3	<b>As Appropriate</b>	<p style="text-align: center;"><b><u>Applicable Engineering Standards*</u></b></p> <p>Responsibility for : - direct operation - a support role.</p> <p>*e.g. ER029 / MDS1000</p>	Supplier with WHL input as required.
4	<b>CMM Operation</b>	Operating with WHL Native CATIA	CMM Supplier or Formal Service Provider