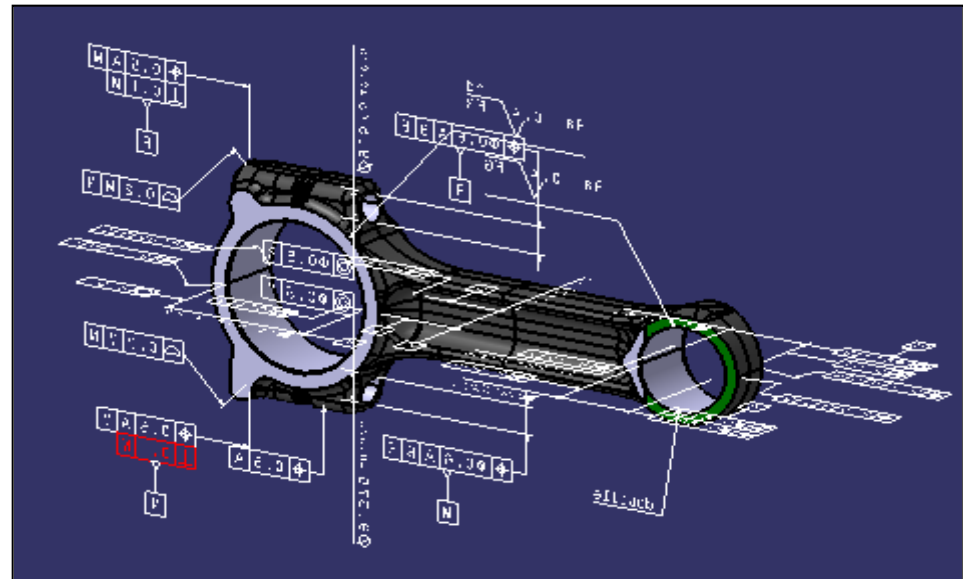IBM

True Paperless Environment with
3D Master

Technical Overview
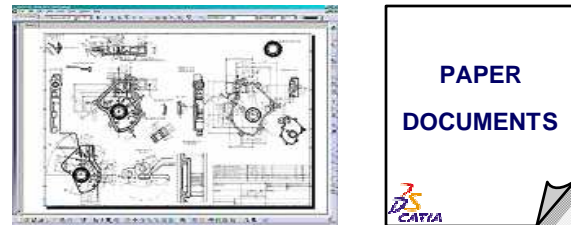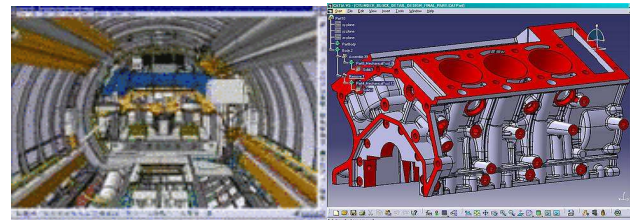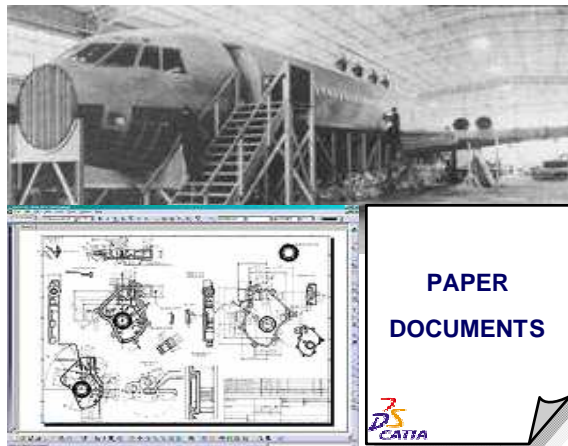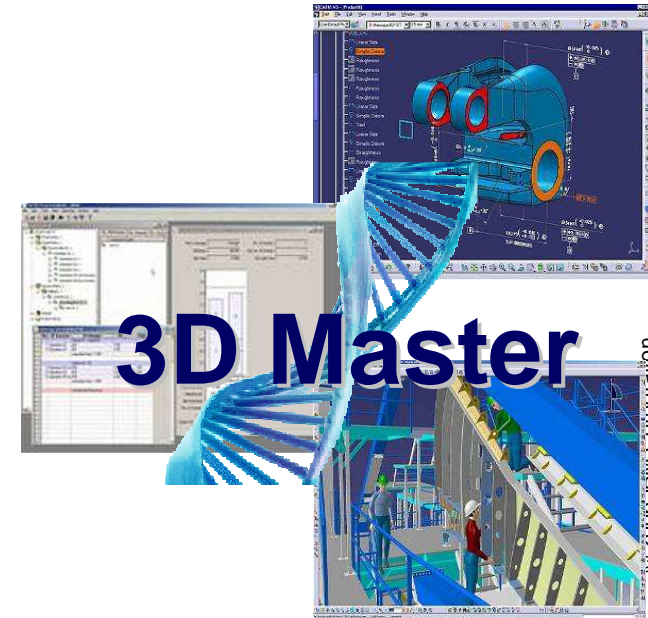
Tim Greenwood

CATIA

CATIA

3D Master: Context

- **Drawings and paper documents based definition**
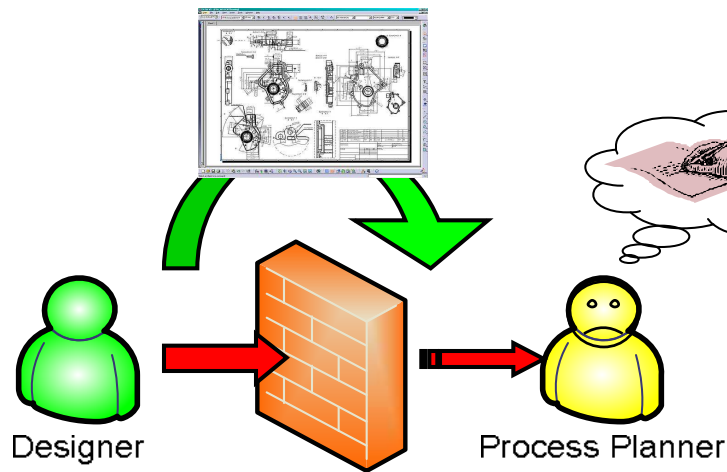- **Numerous physical models**

- **Digital mock-up**
- **3D Models**

- **Drawings and paper documents based definition**

3D Master

- **100% 3D Model Based Definition**

PAPER DOCUMENTS

PAPER DOCUMENTS

1980   **1990**   **Now**

3D Master: Customer issues

- **Manual interpretation prone to error**
- **Bad communication & misunderstanding between disciplines**
- **Processes disruption due to manual recapture of information and rework of the data**

Designer

Process Planner

?

- **Lengthy & costly drawing process**
- **Costly amount of documents to manage**

3D Master: Customer requirements

- Single reference
  - Reduce the number of data
  - Simplify the product data management
  - Suppress the drawing activity
  - Facilitate the exchanges and the collaboration
- Processes automation (seamless processes)
- Smart reviewing tools
- Knowledge capitalization tools
- Product quality advisor and controller

3D Master

- Enhance the quality of the product definition by removing inconsistencies between 3D definition and 2D Drawing definition.
- Enhance the quality of the product definition by checking full compliance to ISO or ASME standards.
- Direct consumption of the design intent by the downstream applications
- A single source (the 3D) that contains the complete Product, Process and resources definition.
- Integrate manufacturing and engineering teams
- Facilitate communication and common understanding
- Dedicated reviewing tools

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3D Master: Authoring

Functional Tolerancing & Annotations

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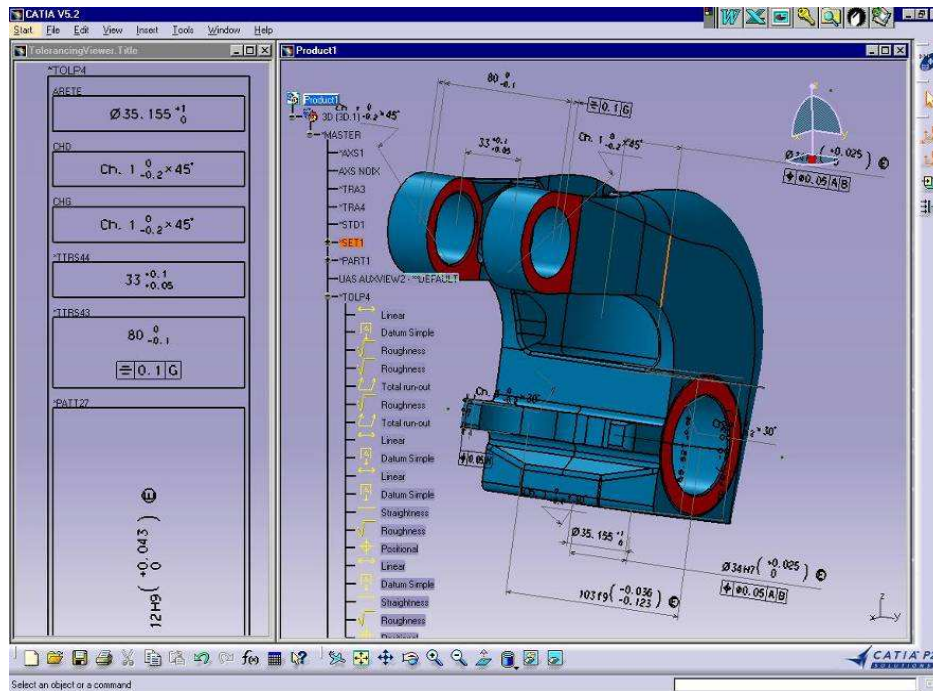
- ➤ **Proposal of applicable tolerance types regarding the selected surfaces**

- ➤ **Proposal of tolerance options when applicable**

- ➤ **Tolerancing rules verification**

- ➤ **Automatic support of annotation syntax (GD&T)**

3D Annotations, Dimensions & Tolerances

- Validate the Dimensioning and Tolerancing specifications
  - Assist the user in the correct definition of D&T specifications (Tolerancing Advisor capabilities)
  - Check the validity (according to ISO or ASME standards rules) of D&T specifications
    - For all the geometric and tolerancing scheme modifications

- Reuse by Downstream Applications
  - Tolerance analysis
  - Manufacturing (manufacturing process definition and tolerance charting)
  - Assembly process planning
  - Inspection and metrology
  - Company internal applications
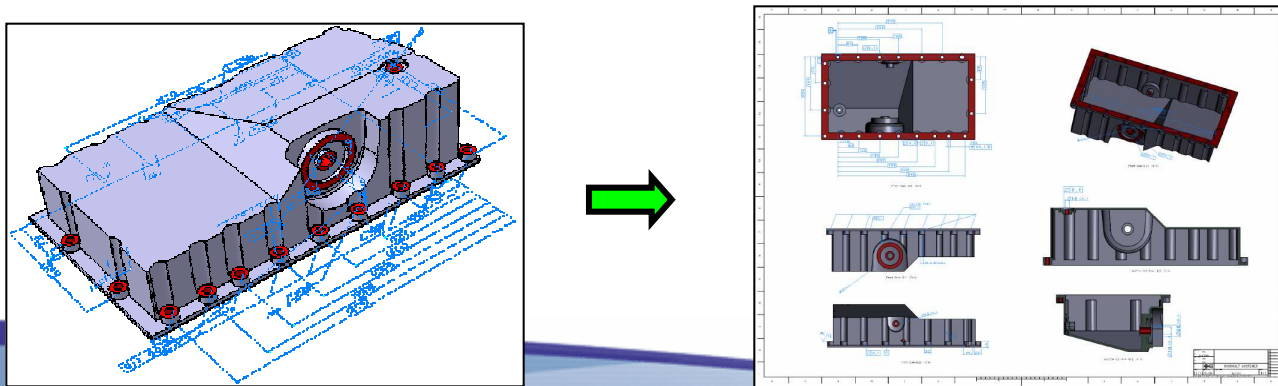
Funct & manuf specs
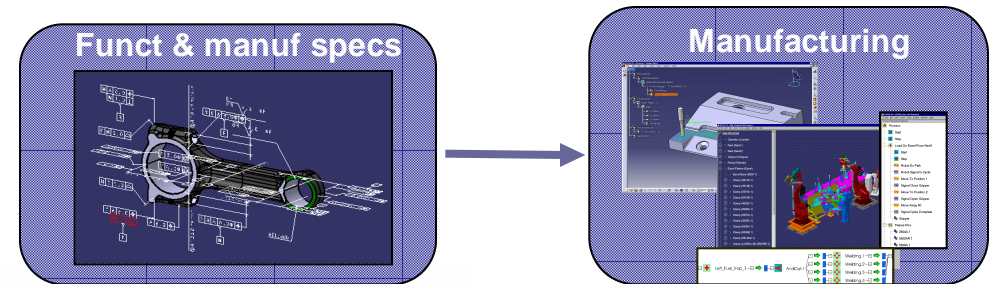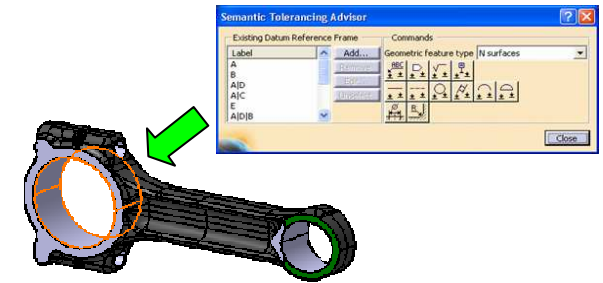
Manufacturing

Review and printable drawings

- Printable 2D Layout containing part/assembly specifications
  - Capability to filter elements to be displayed/printed
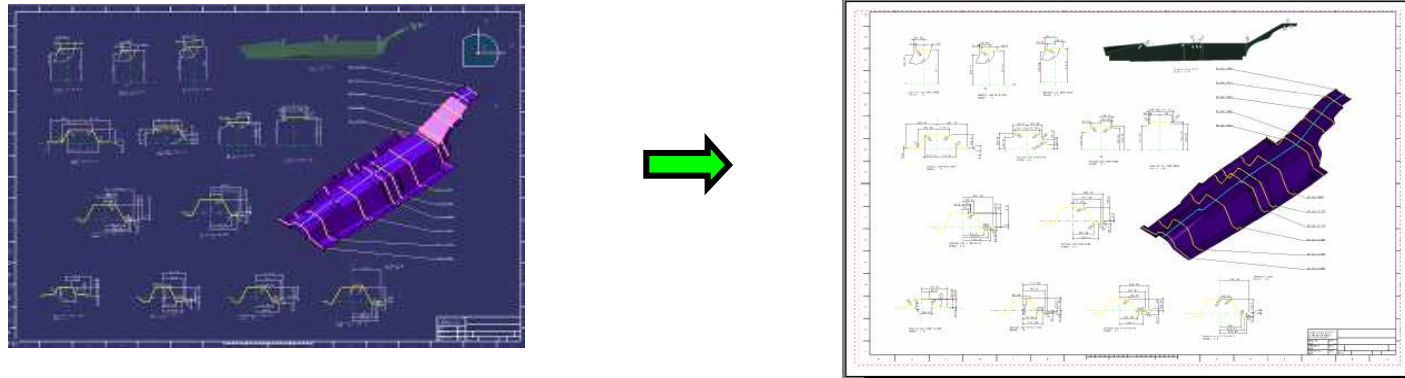
- 2D Layout to display and print functional & manufacturing specifications
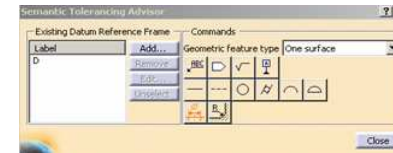 - Creation of a view by specification set

Functional & Manufacturing specification design

3D Manufacturing Design

BENEFITS

➔ Creation of functional & manufacturing specifications

- ➔ **Specifications attached to 3D geometry**

- ➔ **Use of the Advisor to guarantee semantic & syntactic validity**

➔ Get all the design , functional & manufacturing specifications within a single document

- ➔ **Facilitate data management**

- ➔ **Facilitate communication and communication using only one data repository**
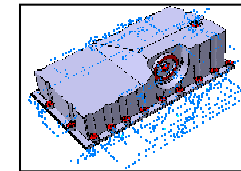

➔ Facilitate and simplify functional & manufacturing specifications

- ➔ **<u>3D review:</u> Gather and filter selected specifications in specific sets a better visualization of both specifications and geometry**

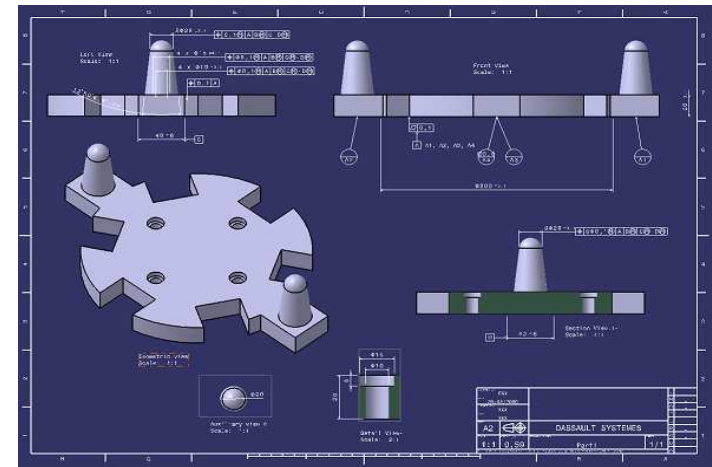- ➔ **<u>2D review:</u> Display the specification sets on a 2D layout sheet to visualize all the specifications at the same time**
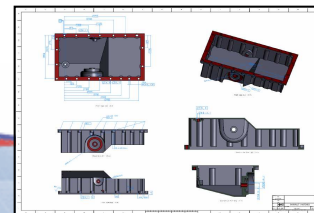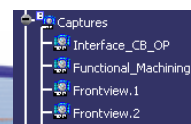
3D Master: *Communication & Review*

**Generative Drafting views
from 3D capability**

2D layout for 3D Design
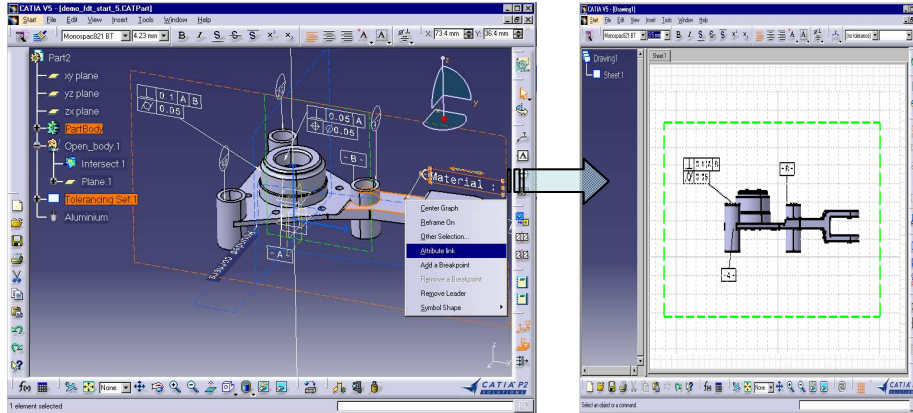
✓**Projection view extraction.**
✓**Section view extraction.**
✓**Section cut extraction.**
✓**Offset and Aligned section views and
section cuts**

✓**Definition:**
   ✓ Manual.
   ✓ Assisted.
✓**Transparent display of
the 3D:**
   ✓ Along several view points
   ✓ With annotation filtering
✓**Saved inside the 3D
documents.**
   ✓ **Print.**

3D Master major scenarios

❶ From 2D conceptual to 3D Detailed Design

– **Easily extracts & uses conceptual design outputs for detailed design**
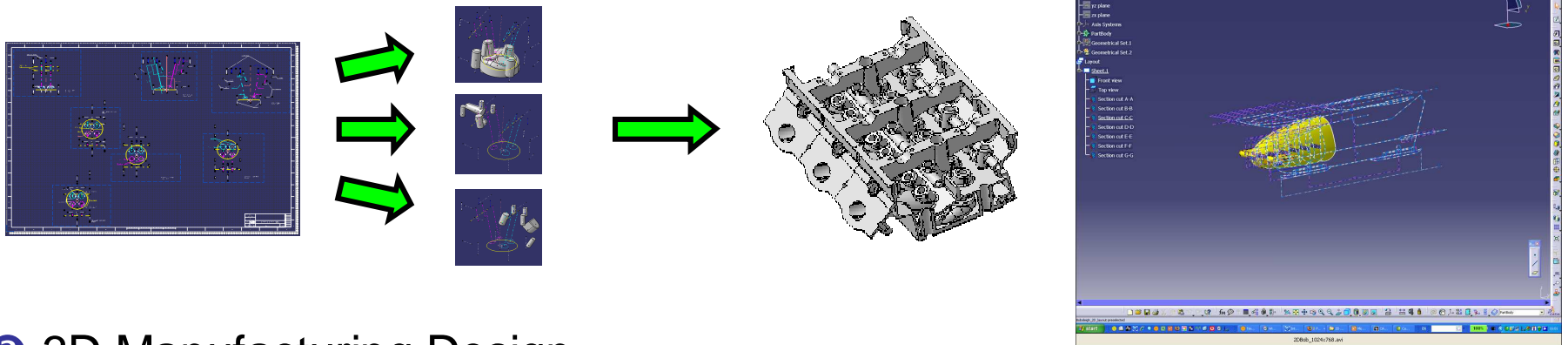
❷ 3D Manufacturing Design

– **Creates and organizes Functional and Manufacturing Specifications**

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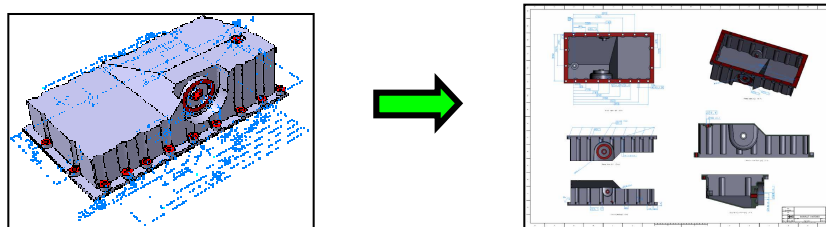# From 2D Conceptual To 3D Detailed Design

BENEFITS

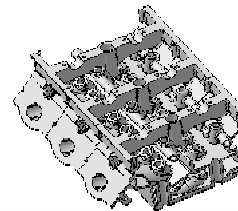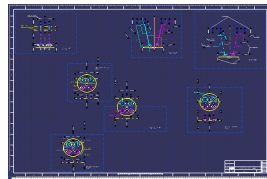➔ 2D conceptual specifications stored at a single location

- ➔ **Conceptual studies done in 2D to allow fast reviews to estimate/validate feasibility**

- ➔ **No need to manually fetch the required information to perform modifications**

➔ Possibility to start detailed design while conceptual study is still on going

- ➔ **Conceptual modification changes will automatically impact 3D detailed designs**

- ➔ **Several design alternatives can be studied at the same time**

- ➔ **Possibility to allow conceptual designers to have a better understanding of different design alternatives by studying the 3D detail design or digital mock-up**
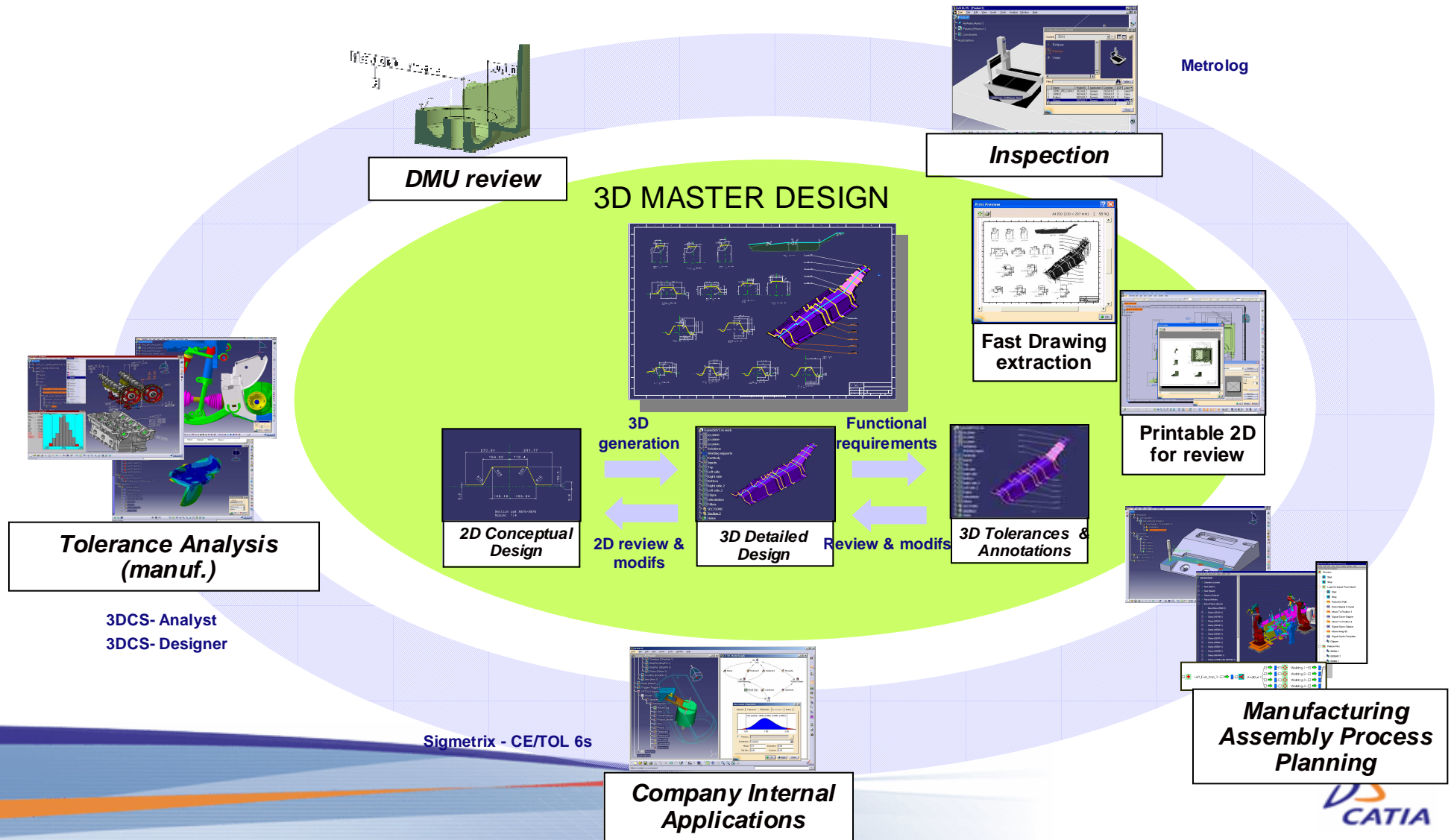
➔ Better Interlock between detail engineering and concept engineering departments

- ➔ **Number of Mock-up studies reduced because of the close integration between conceptual & detailed design phases allowing a better data homogeneity and integrity**

- ➔ **Number of errors and defects reduced because of communication improvement**

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3D MASTER Processes

Move fully into the 3D world combining both 2D and 3D benefits

Metrolog

DMU review

Inspection

3D MASTER DESIGN

Fast Drawing extraction

Printable 2D for review

3D generation

2D Conceptual Design

2D review & modifs

3D Detailed Design

Review & modifs

Functional requirements

3D Tolerances & Annotations

Tolerance Analysis (manuf.)

3DCS- Analyst

3DCS- Designer

Sigmetrix - CE/TOL 6s

Company Internal Applications

Manufacturing Assembly Process Planning

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Any Questions?

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