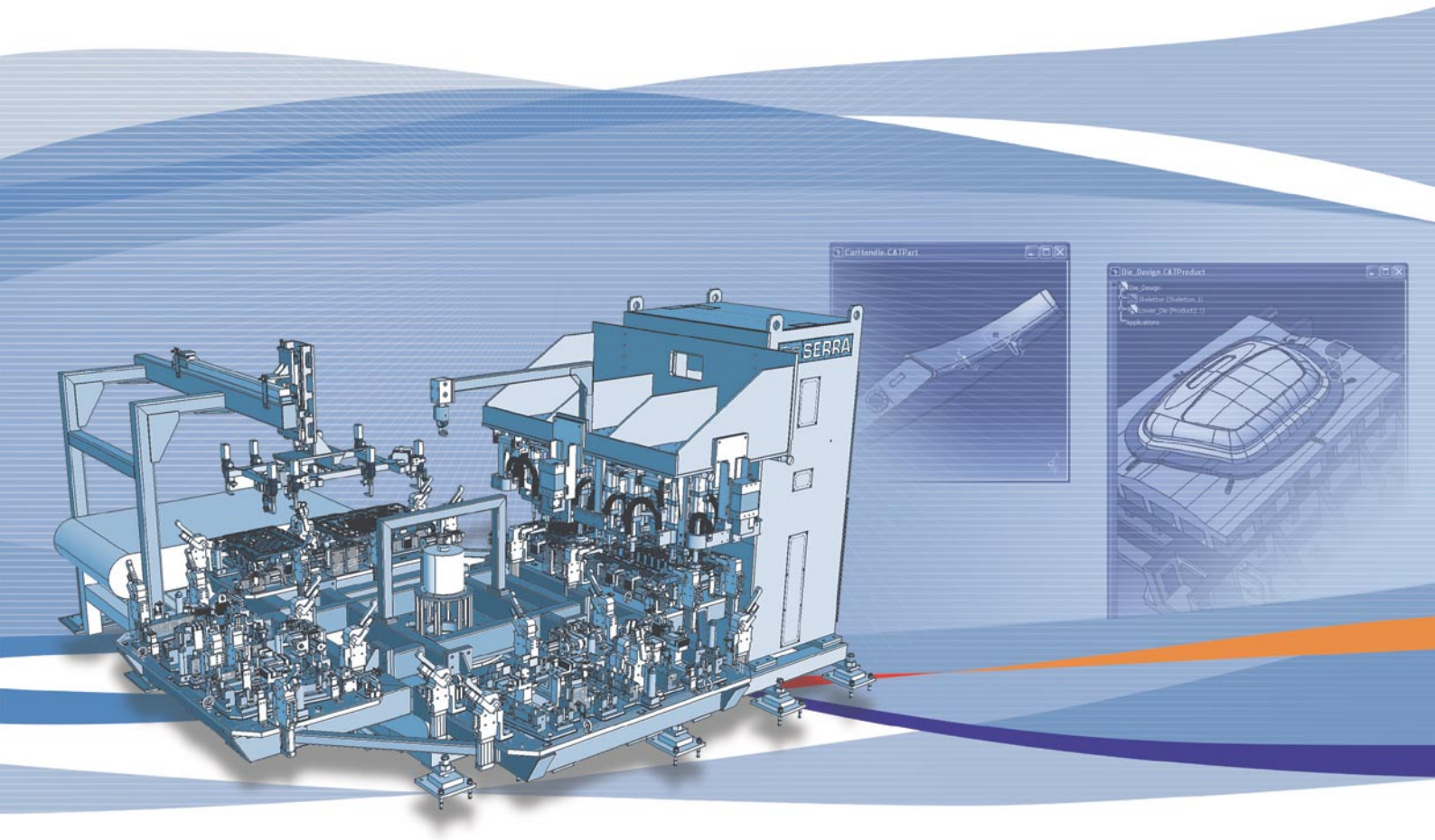
IBM Product Lifecycle Management (PLM)

Generative tooling for automotive jigs, fixtures, molds and dies



DS CATIA

DS SMARTEAM

Product Lifecycle Management for the Automotive Industry

Automotive manufacturers are faced with an increasingly demanding market. Lead times are getting shorter and customers are calling for more sophisticated products. Fierce competition is making it harder to win new customers and keep their loyalty. In addition, industry pressure continues to build, with a growing need for standards compliance, and an inescapable reliance on suppliers.

To meet the challenges of today's automotive industry, manufacturers and suppliers must deliver high quality products in less time, while driving costs down and improving their design processes.

The need for improved tooling design

One major opportunity to reduce time-to-market is the traditional manual design of critical jigs and fixtures, mold and die tools that are a fundamental part of the car manufacturing process.

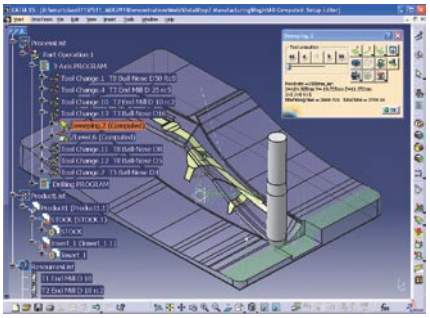
One European OEM found that common tooling design tasks, that took an average of 20 minutes, could be performed with CATIA V5 in 30 seconds – a 40 fold improvement in time – and at one tenth of the cost.

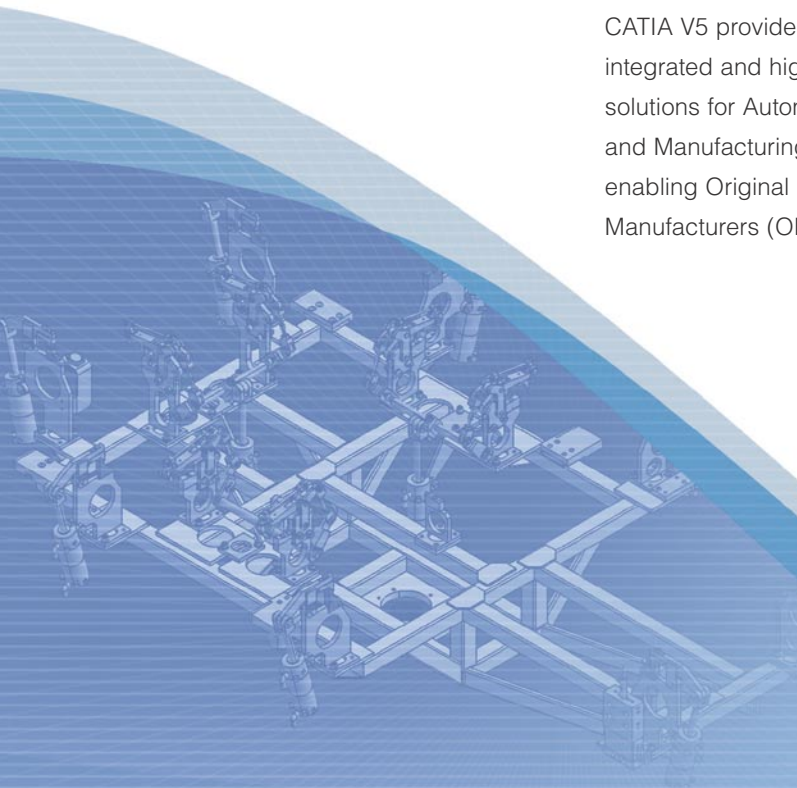
These are the results manufacturers and suppliers all over the world can enjoy through CATIA V5 – the market-leading suite of Product Lifecycle Management (PLM) solutions from IBM.

The answer – CATIA V5

CATIA V5 provides easy-to-use, fully integrated and highly automated solutions for Automotive Tool Design and Manufacturing processes, enabling Original Equipment Manufacturers (OEMs) and suppliers to reuse previously validated designs to reduce development times and cut costs. Information can be managed and shared by all parties in the supply chain, no matter where it originates and irrespective of its CAD format.

- ***Significantly reduce time to market with automated tool redesign and modification***
- ***Embed and reuse information and best practice throughout your organisation***
- ***Improve tooling design quality***
- ***Prevent late detection of errors impacting delivery.***





Generative tooling with CATIA V5

With CATIA V5, OEMs and suppliers can significantly reduce the costly and time-intensive creation and modification of jigs and fixtures, molds and dies.

CATIA V5 makes it possible to design all the associated tooling using 3D geometry and embedded experience from previous designs. It 'copies' previously validated engineering rules and tooling definitions to automatically create new designs or modifications in a fraction of the time traditionally taken. Templates based on full 3D CAD geometry can be generated as standard master designs, and provide the links to simulation and manufacturing, all within one integrated set of applications.

Capitalising on intellectual property

With CATIA V5 selected knowledge, skills and experience in the supply chain can be captured and embedded, so that this intellectual property can be reused and exploited by approved parties for future designs and modifications.

Instead of different designers using different methods and different rules CATIA V5 provides consistent rules to be followed to create homogenous designs. This ensures standardisation and consistency throughout the tooling design and manufacturing process, so that accurate results are delivered time and time again. Being able to apply standardised design rules also enables engineers to work simultaneously on different areas of the redesign to dramatically reduce overall development time.

Ensuring accuracy of designs

CATIA V5 also delivers more accurate simulation and validation prior to design completion to ensure the accuracy of the finished model – preventing costly errors so reducing the need for lengthy prototyping and trialling. Designers are able to determine manufacturing feasibility earlier in the design cycle, reducing costly re-work. This dramatically cuts time to market when compared to using other CAD systems, with increased quality and fewer errors.

Sharing accurate data

With 90% of tooling design being outsourced, it's essential that all parties in the supply chain are confident they are using the same, accurate data. Part of the IBM PLM suite of solutions, SMARTEAM ensures the distribution and access to product information across the extended enterprise, with controlled management and updating of any revisions. For more information on SMARTEAM please refer to the brochure, *'Collaboration for the Automotive Industry.'*

What automotive companies achieve with CATIA V5

- ***Faster tooling design***
  Accelerate, automate and optimise the entire tooling design process.
- ***Maximise company know-how***
  Reuse validated tooling solutions from previous projects.
- ***Collaboration***
  Enhance collaboration between design, simulation and manufacturing based on the latest data.
- ***Integrated business processes***
  One integrated environment to support all business processes, and to provide the backbone for communication and the paperless engineering environment.
- ***Rapid implementation***
  CATIA V5 does not require intensive or time-consuming deployment – many manufacturers have completed CATIA implementations in a matter of weeks.

CATIA V5 for Jigs and Fixtures

An assembly line to produce a contemporary vehicle features thousands of jigs and fixtures of all types to hold, check, assemble and join various components as they come together during the various stages of the manufacturing process. A typical assembly line will feature over 1000 stations – including 400 welding stations, with 20 fixtures each, and 300 checking stations – which means over 10,000 towers will be needed.

This rising complexity demands that manufacturers and suppliers move from 2D techniques to full 3D digital design and manufacturing. At the same time, the tooling designs can be very similar between different car programmes and can be used repetitively on the same project. With 2D or basic 3D processes, jigs and fixtures need to be redesigned from scratch. This extensive re-design wastes time and runs the risk of creating mistakes – errors that are frequently only discovered in plant, delaying ramp-up, increasing time to market, forcing costly and time-consuming rework, and creating friction between manufacturers and suppliers.

A better approach – CATIA V5

With CATIA V5 you can generate tooling designs which are associated, or linked, with the product they hold, handle or fix. Hence, when the design of the product changes, the generative or associated tooling can be updated automatically.

By reusing existing tool designs which have been previously validated, standardization and design quality is enforced.

Experience with customers indicates that 60% of Jigs and Fixtures can be derived from a minimal set of generative tool templates which minimise the need for one-off or customised design.

Going beyond 3D parametric capability

CATIA V5 has capabilities ahead of its time that makes the solution superior to standard 3D design.

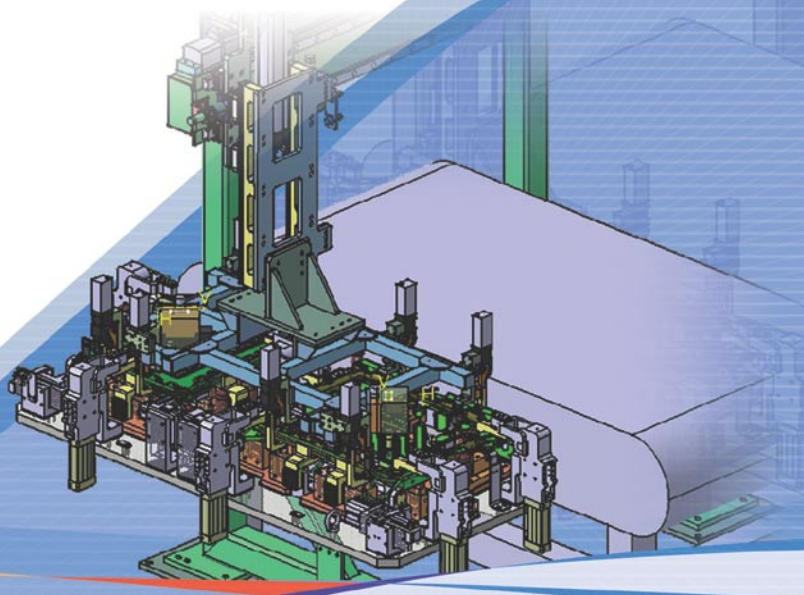
With traditional 3D solutions there is limited standardisation of components, preventing their reuse in future designs and increasing design time. With CATIA V5 knowledge, engineering rules are embedded into the customised Generative Template to ensure standardisation and consistency across numerous designers. This gives engineers the freedom to create designs to predefined rules, ensuring that those designs can be reused time and time again with assured results.

This standardisation of jigs and fixtures at part and assembly level also reduces tooling and manufacturing costs, and makes it possible for suppliers to deliver 3D jigs and fixtures designs that can immediately be used for assembly and manufacturing simulation.

Unique shape morphing capabilities within CATIA V5 mean that when the panel or part are changed, through Knowledgeware, tools can be automatically, modified, updated or repositioned. Automatic extraction of drawings direct from the models reduces paperwork and further speeds up the design process.

Benefits of CATIA V5 for jigs and fixtures:

- *Optimises component and design rules standardisation.*
- *Enables faster engineering changes for reduced design and build time.*
- *Maximises reuse of intellectual property.*
- *Earlier tooling validation by inserting design rules and quality checks in the tooling templates*
- *Improves design quality.*
- *Reduces development cost and manufacturing re-work.*
- *Quicker access to Digital Manufacturing simulation.*



CATIA V5 for Mold Tooling

A better approach – CATIA V5

CATIA V5 supports the entire mold design and manufacturing process, from concept through to preliminary testing, production and support. The solution provides dedicated applications, mold-oriented functions and objects to optimise and accelerate mold design, with an intuitive, easy-to-use application interface that renders both casual and expert users quickly productive.

Embedding of design rules into the solution promotes the sharing of experts' best practices, with maximum automation and standardisation. The creation of associative assemblies also allows for late design changes to be delivered simultaneously, with quick and reliable modification of products and tools.

CATIA V5 includes highly specialised and unique applications that have been developed specifically with the mold designer in mind. The solution's Core and Cavity and Mold Tooling features provide early estimation of the feasibility of the mold's eventual design, and enable quick evaluation of cost. In addition, the Healing Assistant provides automated repair of geometric data to dramatically facilitate the typically time-intensive task of cleaning surface data.

The result is rapid development, saving time, reducing cost and improving quality.

Benefits of CATIA V5 for mold design and manufacturing

- *Specific CATIA V5 applications developed with innovative moldmakers*
- *One single solution to cover the entire process, from mold design to manufacturing.*
- *High level of automation of mold design and manufacturing operations.*
- *Capitalisation of company knowledge and expertise to enable best practice to be shared where appropriate, and reused.*
- *Automatic update of the entire mold and manufacturing operation when designs change.*

CATIA V5 for Die Design and Manufacturing

With Die Tooling Design, the major objective is time to market reduction. Crucial to achieving this, is to capitalise upon the skills, knowledge and expertise employed by the company and throughout the supply chain to enable rapid reuse of validated designs, and automated, easily repeatable, standardised processes.

A better approach – CATIA V5

CATIA V5 supports the entire die design and manufacturing process, from concept through to preliminary testing, production and support. Users can build generic reusable templates and associative assemblies for simplified modification. Knowledge transfer and exchange of component libraries can be achieved at minimal cost.

CATIA V5 enables Press Die Design and product design to be delivered at the same time. It allows for late design change and capitalises on the knowledge, skills and best practice inherent in the supply chain by embedding it into the software and processes. This results in significantly reduced tooling design and manufacturing time, with decreased costs for changes and greater accuracy.

CATIA V5 fully supports a paperless process from design to manufacture, with its extensive ability to quickly reproduce digitised physical mock-ups to allow tooling duplication. Unique Shape Morphing and Surface Optimization tools are a first for the industry, and provide capabilities to build in allowances for overcrowning, overbending and other sheetmetal characteristics that are an inherent part of the die design process. Since the tooling is generative, the die can be automatically updated once the panel design or style changes, and hence both the product and tooling can be developed at the same time. The generative approach means that tooling can even be developed around a 'dummy' surface, such that when the final surface is substituted, the die face and structure can be automatically updated.

Benefits of CATIA V5 for die design and manufacturing

- *One single solution to cover the entire process, from die design to manufacturing.*
- *High level of automation of die design and manufacturing operations.*
- *Capitalisation of company knowledge and expertise to enable best practice to be shared where appropriate, and reused.*
- *Automatic update of the entire die and manufacturing operation when designs change.*
- *Reduced die development time and cost, with improved design quality.*

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