UGS

Transforming the process of innovation

I-deas to NX Overview and Update

Bob Haubrock – Director I-deas, I-deas / NX Migration, NX Drafting, India Development
Robert.Haubrock@ugs.com

Recent News!

Nissan Selects UGS' NX Software as New Standard for Its Next-generation Computer-Aided-Design (CAD) System to Design and Build New Vehicles

UGS win in multi-year-long contest bolsters company's momentum in CAD segment of Product Lifecycle Management (PLM) market; selection extends to Nissan affiliates

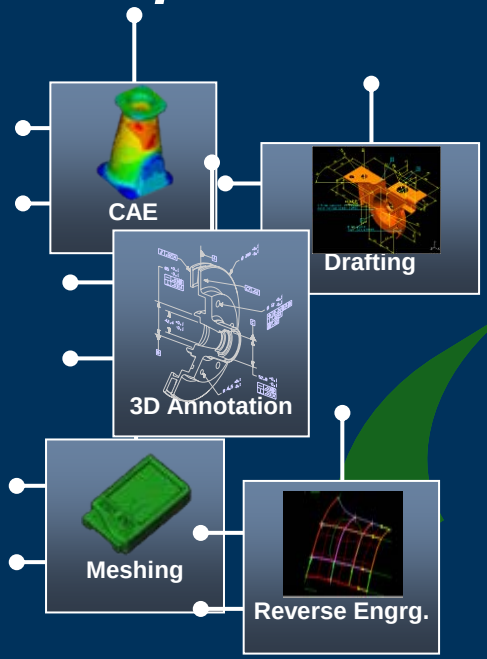
Selection of UGS to help Nissan achieve sustainable growth, profitability and return on investment through Nissan's mid-term business plan "Nissan Value-Up"; Nissan and UGS currently working to complete deployment plan

PLANO, Texas and TOKYO – UGS Corp., a leading global provider of product lifecycle management (PLM) software and services, today announced Nissan selected UGS to be the provider of the new global PLM system that Nissan and Nissan affiliates will deploy to design and build its next generation of vehicles.

UGS expects the selection to represent its largest win in 2005. Nissan will use UGS' NX® CAD software to digitally design its vehicles on a global basis and UGS' Teamcenter® collaborative Product Development Management (cPDM) software to digitally manage product data and enable digital prototyping for all Nissan vehicles across the world. The company will deploy the software as part of a fully integrated, common R&D infrastructure for use inside Nissan.

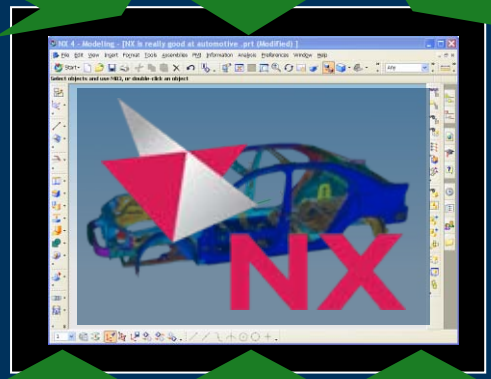
NX Drivers

Superset Functionality to Improve Customer Workflows



Traditional I-deas Strengths

Process-based Workflows & Industry Expertise



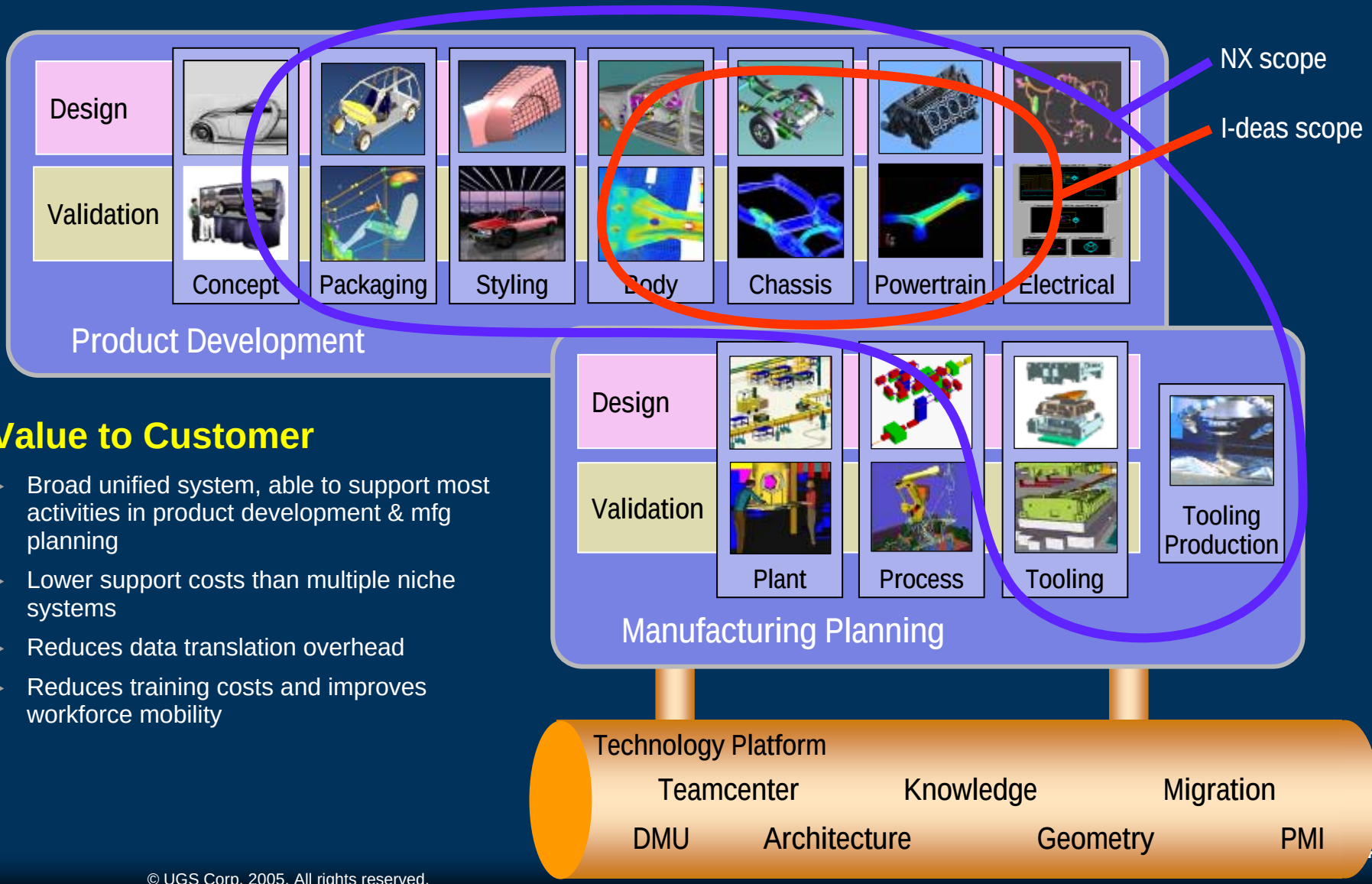
Traditional Unigraphics Strengths

Research & Development

Customer Requests

Advanced Functionality

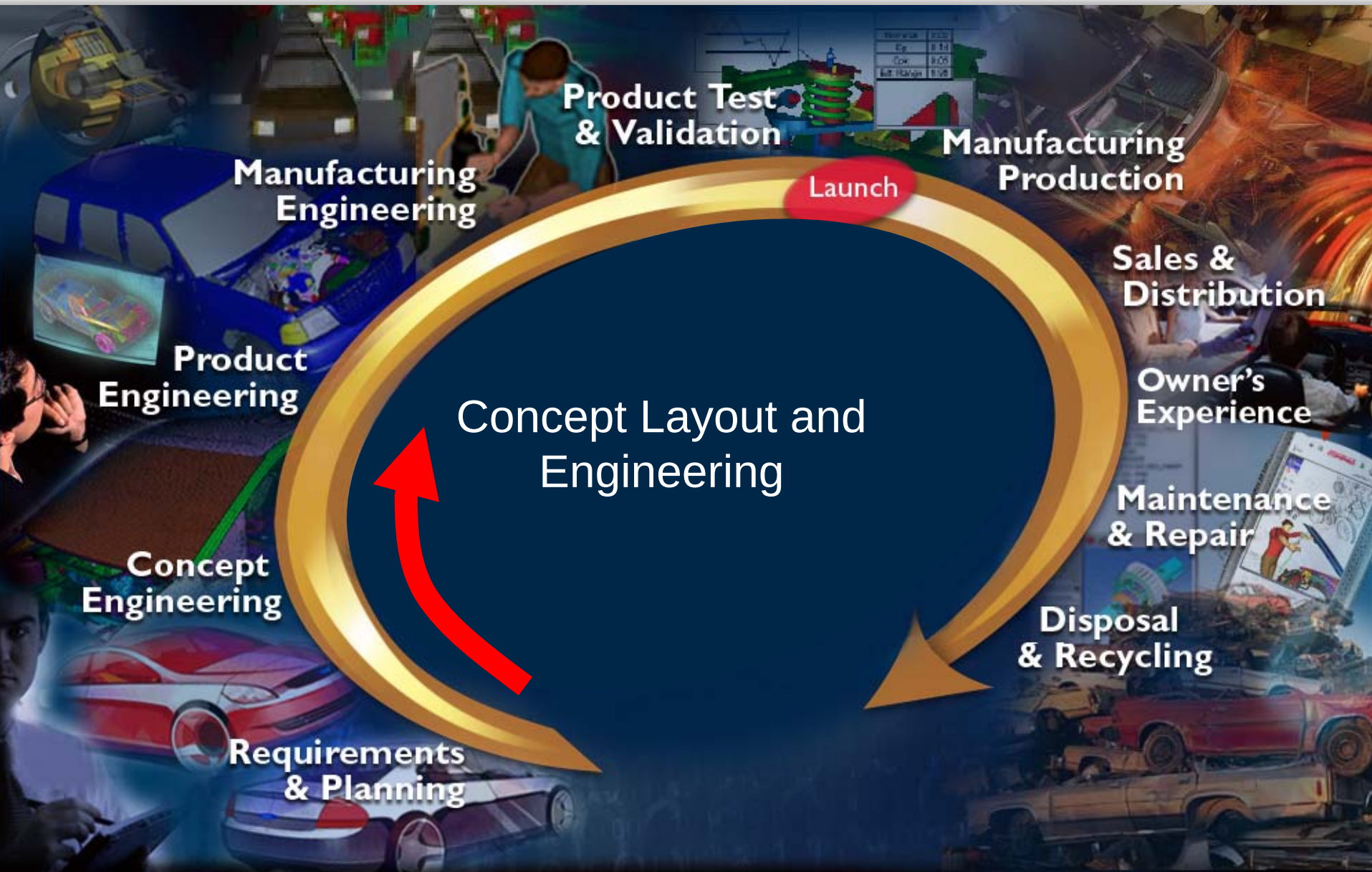
NX Scope



Value to Customer

- Broad unified system, able to support most activities in product development & mfg planning
- Lower support costs than multiple niche systems
- Reduces data translation overhead
- Reduces training costs and improves workforce mobility

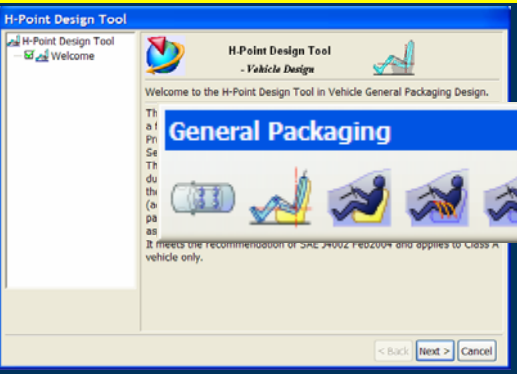
Vehicle Development Lifecycle

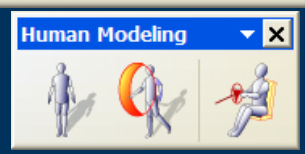


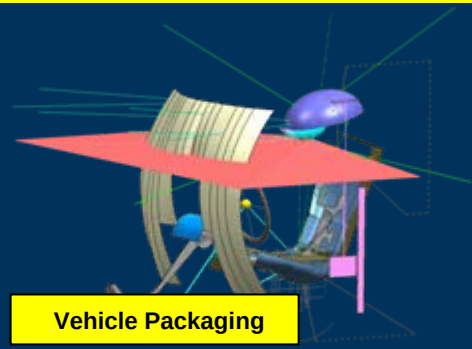
Concept Layout and Engineering

Occupancy & Mechanical Packaging

NX offers a wide range of *OOtB* Occupancy and Mechanical packaging tools

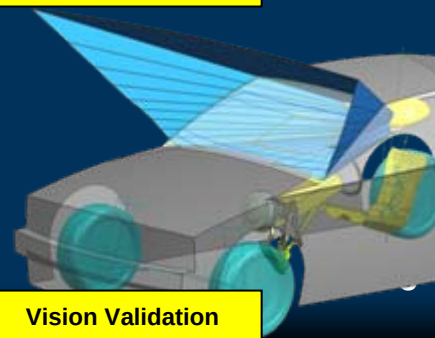






Vehicle Packaging

Integrated Human



Vision Validation

Value to Customer

- Tools ready to go out of the box requiring no customisation costs
- Simple and intuitive wizards reduce training costs
- Industry standards and process knowledge stored for repeatability and standardisation

Technology Enablers

- NX General Packaging Module
  - Hip Point Design, Vision Zone, Reach Zones …
- NX Human Modelling and Posture Prediction
- Embedded Knowledge;
  - Industry Standards (SAE, EEC…)
  - Empirical Research (University of Michigan)

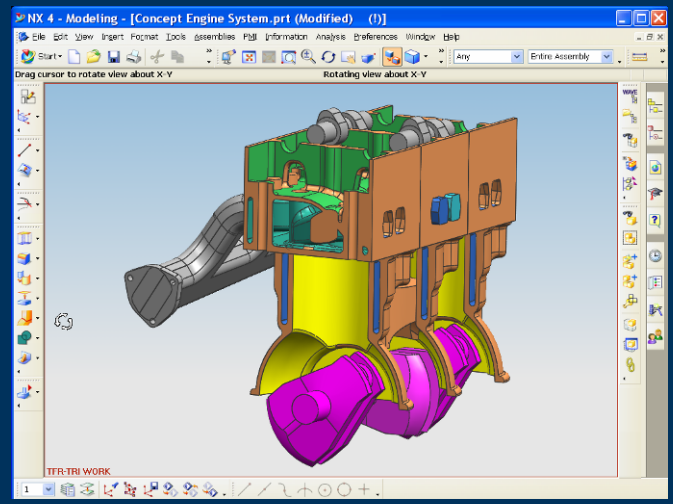
Concept Layout and Engineering

Drivetrain

NX System Level Design enables requirements driven concept layout

Value to Customer

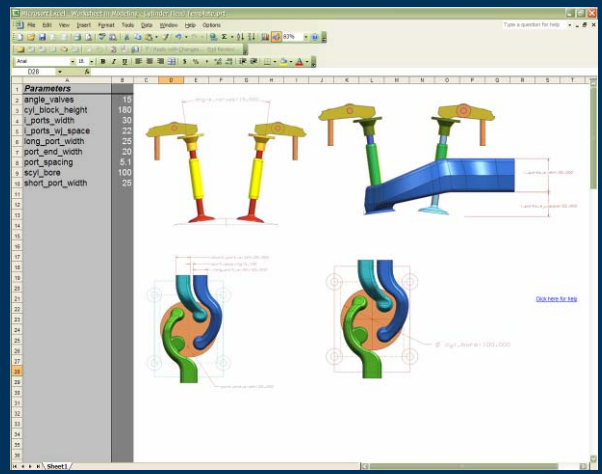
- Reusable product layout templates stores knowledge
- Increases innovation by decreasing development time
- Higher Quality through repeatability
- Lower cost through design reuse



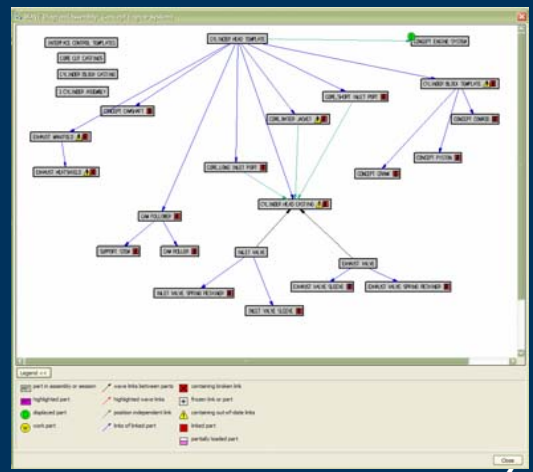
3 Cylinder Concept Engine System

Technology Enablers

- Powerful approach to system level conceptual design and engineering
- Conceptual layout is managed by TC Engineering

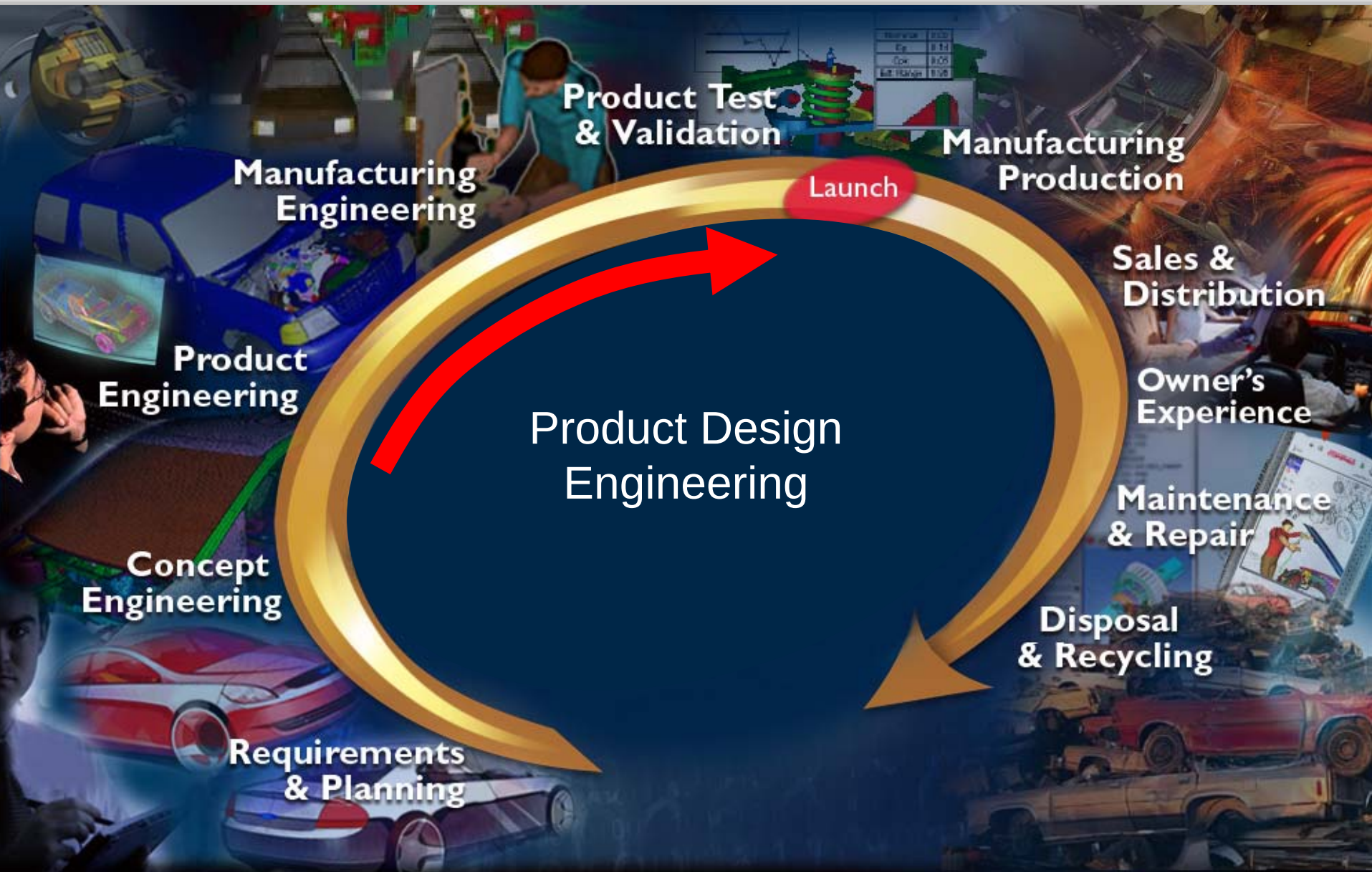


Functional Criteria



System Relationship Map

Vehicle Development Lifecycle



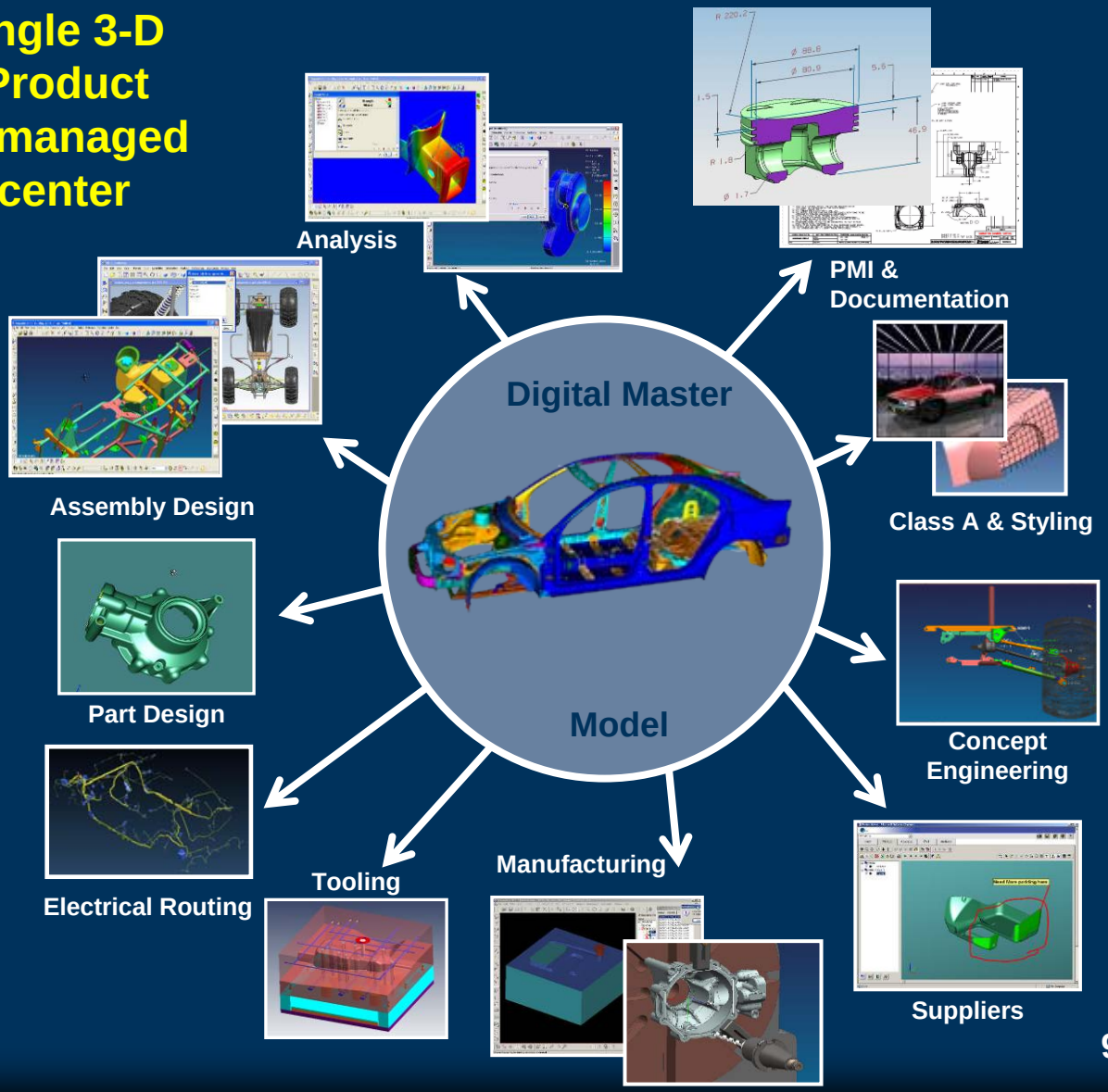
Product Design Engineering

SeCustomeress CAD/CAE/CAX… Integration

NX creates and uses a single 3-D representation of the Product definition … stored and managed centrally within Teamcenter

Value to Customer

- Reduced data transfer (which always leads to delays)
- Reduced Data Management (data translation is always a copy operation)
- Reduced support costs – less effort to install, versions…
- Increased concurrency
- Enables production changes without disruption (Master Model)



Product Design Engineering

Geometry Capabilities

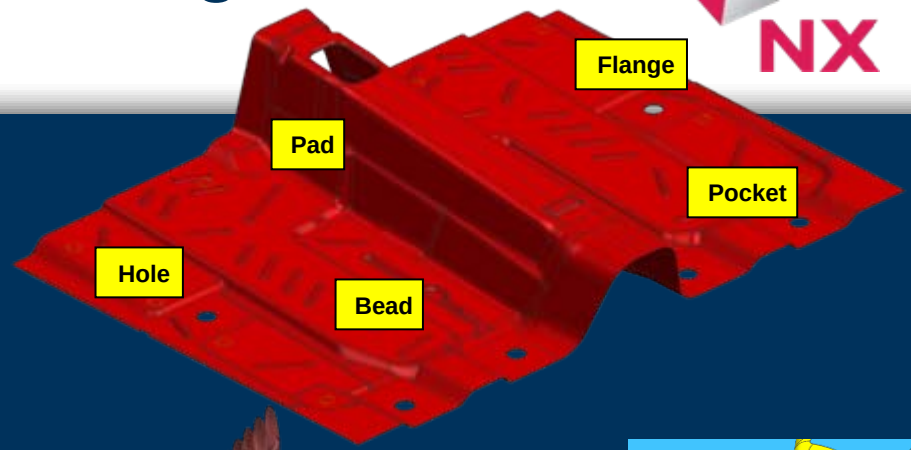
NX

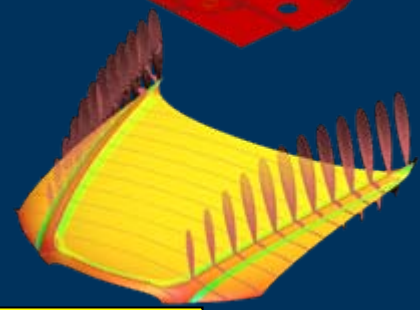
Value to Customer

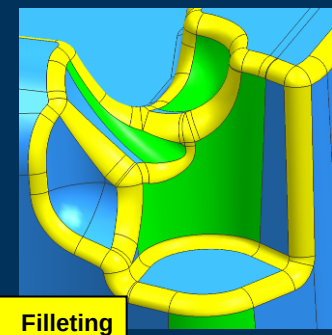
- Faster and more design iterations
  - Increase time designing, reduce time working around technology
- C3P I-deas skills preserved
- Ability to work parametrically on non-parametric, imported data (Catia V4)

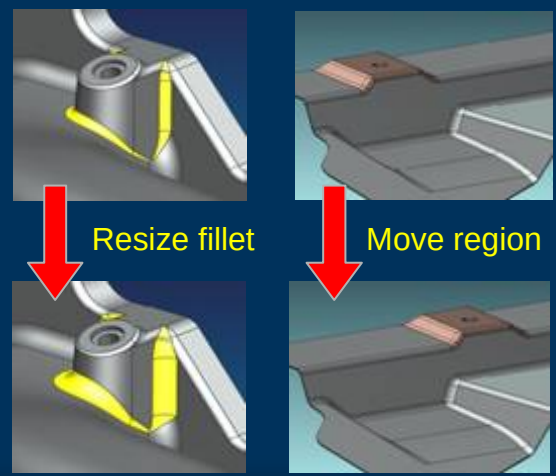
Technology Enablers (Examples)

- Filleting and draft
- Leading Geometry Engine
- Integrated Modeling Environment; model with solids, surfaces, JT and mesh in a single environment
- Parametrics on demand (DMX)
- Specialized automotive modeling functions
- I-deas features implemented and improved in NX
- …









DMX Functions

- Offset face
- Move region
- Replace face
- Add draft
- Resize fillet

Product Design Engineering

Integrated Class A

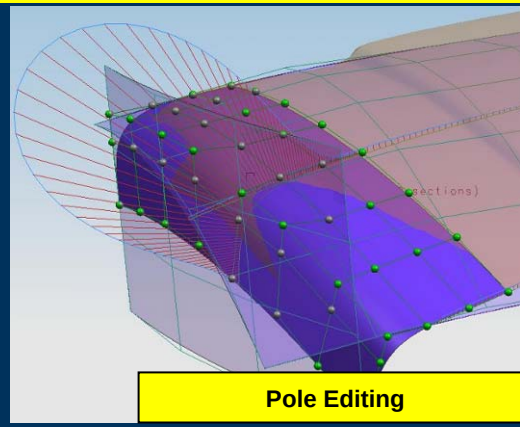
NX offers a complete, integrated and productive Class A Solution

Value to Customer

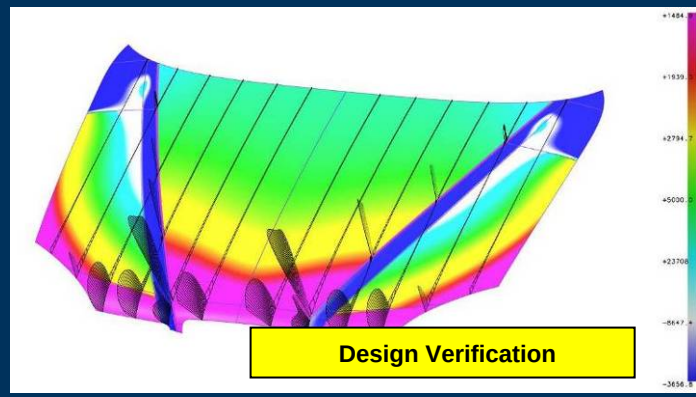
- Integrated physical and digital models
- Integrated Design Verification
- Easier/Faster Reaction To Change

Technology Enablers

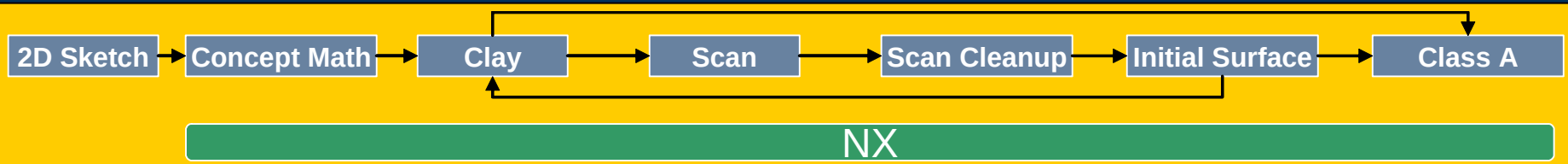
- Integrated surfaces and solids with Parasolid
- Mixed Mode Surfacing tools (Pole Editing, Sweeping, By Curves)
- Hybrid Modeling
  - Surfaces, facets, Solids, Wireframe one model
- Parametric Class A functions
  - Styled Blend, Silhouette Flange, Styled Sweep, Styled Corner, …
- Scans (STLs) -> rapid surfacing, fit curves and surfaces to scans



Pole Editing



Design Verification



Product Design Engineering

Body Design Assistants

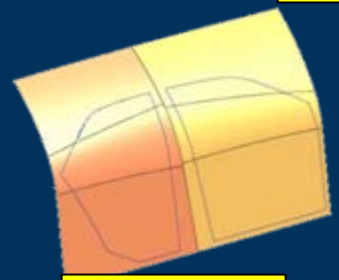
Beyond general world class modeling, NX offers OOtB integrated tools

NX Body Design is a collection of assistants tailored to the specialized task of automotive body design

1. Hinge Location
2. B Pillar
3. Glass Drop
4. Egress Curve
5. Body Side
6. Sectional Formability
7. Stone Impingement
8. …


Hinge Location


Glass Drop

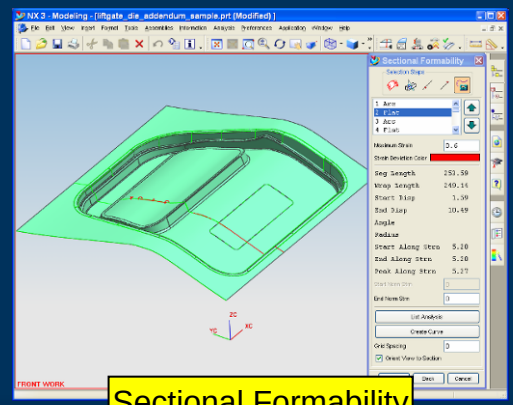

Egress Curve

Value to Customer

- Significant savings through OOtB process automation

Typical Modeling Times:

Practice	Conventional Method (experienced CAD user)	Process Assistant Method (novice NX user with assistant)
Hinge Location	3-4 days	7 min
Glass Drop	1 day	12-15 min


Sectional Formability

Product Design and Engineering

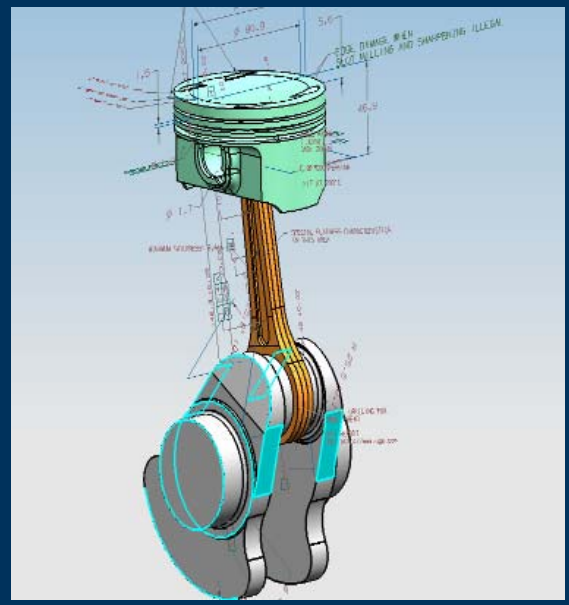
Design Documentation

Value to Customer

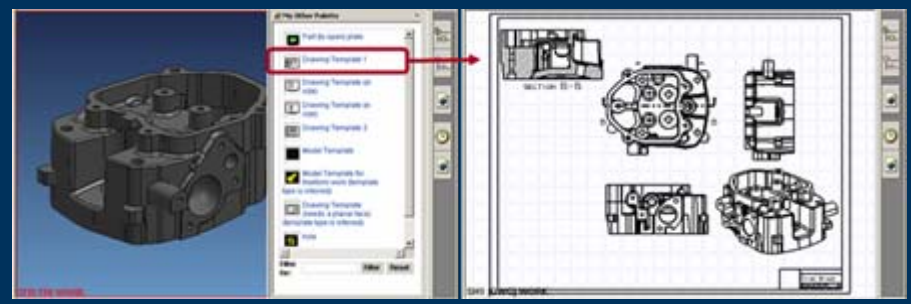
- Reduce dependency on drawings through the application of product and manufacturing information (PMI)
- Automated Drafting

Technology Enablers (Examples)

- Highly Productive User Interface
- PMI Application
  - ASME Y14.41
  - ISO standard 16792
- Drawing Templates
- PMI is associatively inherited onto a drawing



PMI Authoring in NX



Drawing Templates increase documentation productivity

Product Design and Engineering

Electrical Systems Routing

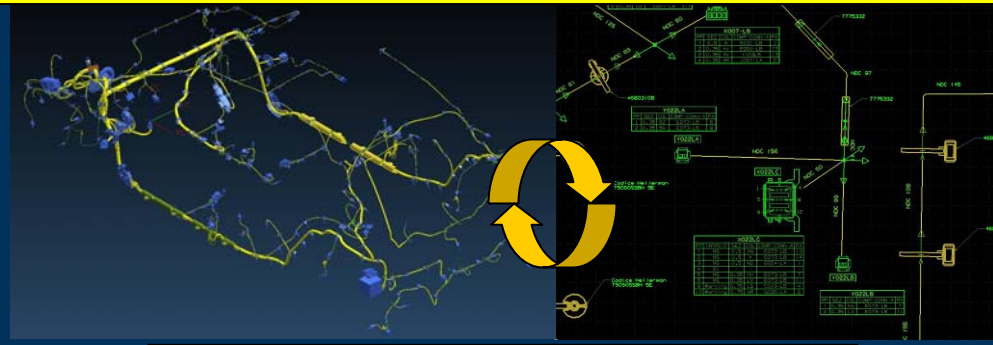
NX enables associative, integrated mechanical & electrical routing

Value to Customer

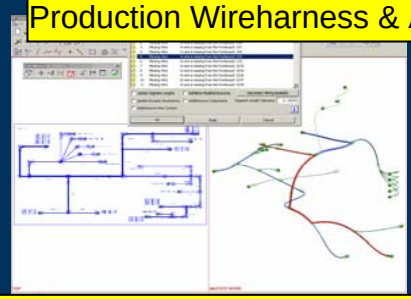
- Concurrency with rest of vehicle development
- Automatically handles change
- Factors in Manufacturing requirements

Technology Enablers

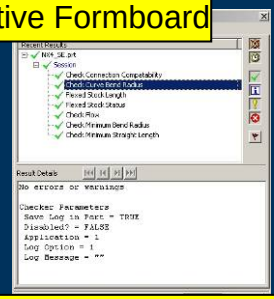
- Fully associative electrical routing capabilities
- Design Optimisation
- Harness dressings
- Associative Electrical Formboard
- Knowledge-driven Routing and Automation
- Design Rule Validation



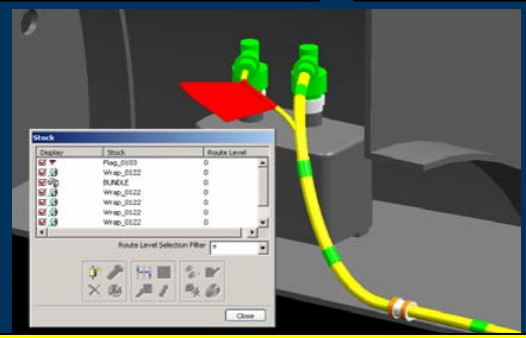
Production Wireharness & Associative Formboard



Routing Electrical Formboard



Design Rule Validation



Harness dressings: Tape, Tube, Flag…

Product Design and Engineering

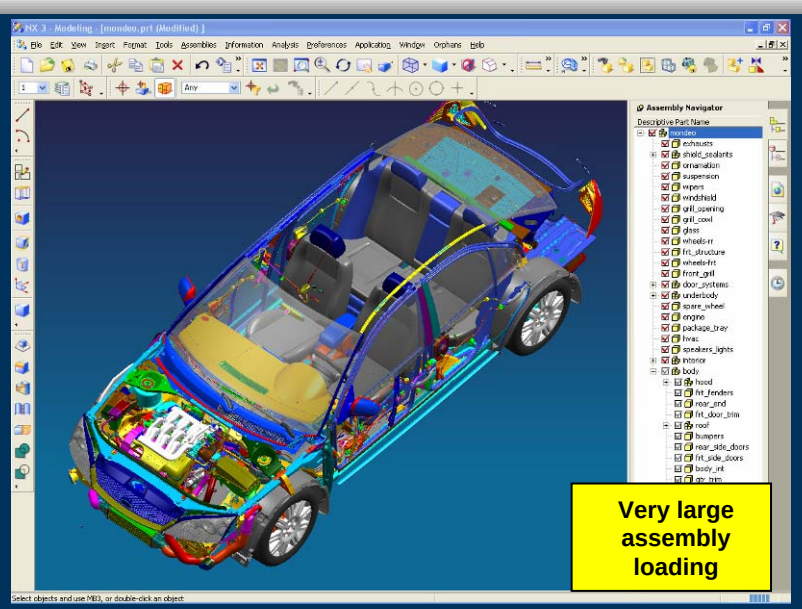
Digital Mock Up On Demand

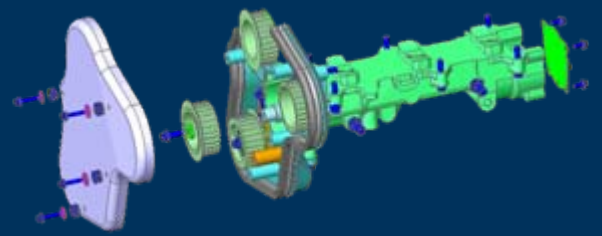
Value to Customer

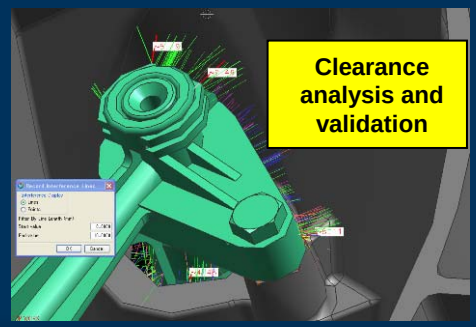
- Ability to create, review, modify and validate very large virtual Multi-CAD designs
- Increase time designing, reduce time working around technology

Technology Enablers

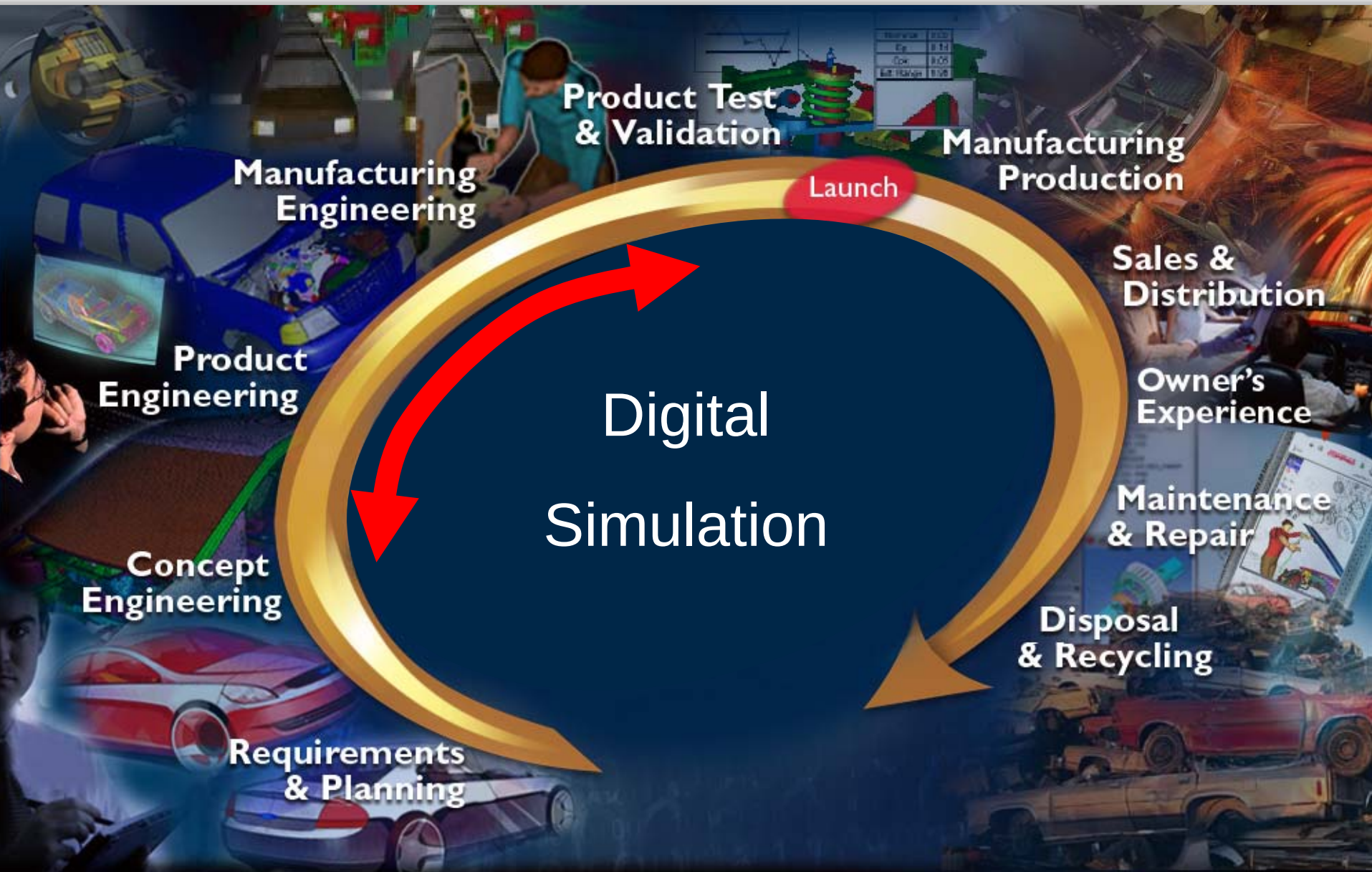
- Direct access to and interoperability with JT parts and assemblies enables seCustomeress multi-CAD environment
- Integrated JT representations
- Extensive component filtering capabilities
- Solid and facet based clearance analysis
- Sectioning and measurement tools
- Sequencing
- Direct support of migrated I-deas configurations and assembly constraints







Vehicle Development Lifecycle

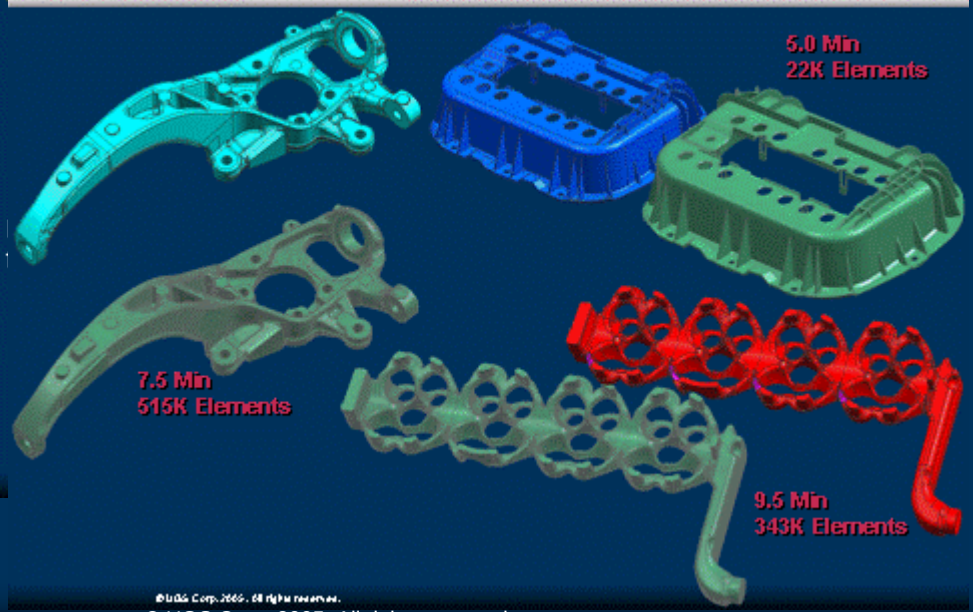


Advanced Complex Meshing

Batch meshing improves vehicle timing

Getting to a high quality mesh accounts for over 65% of the time we spend in the analysis cycle -- GM

- Block
- Head
- Oil Pan
- Other Examples



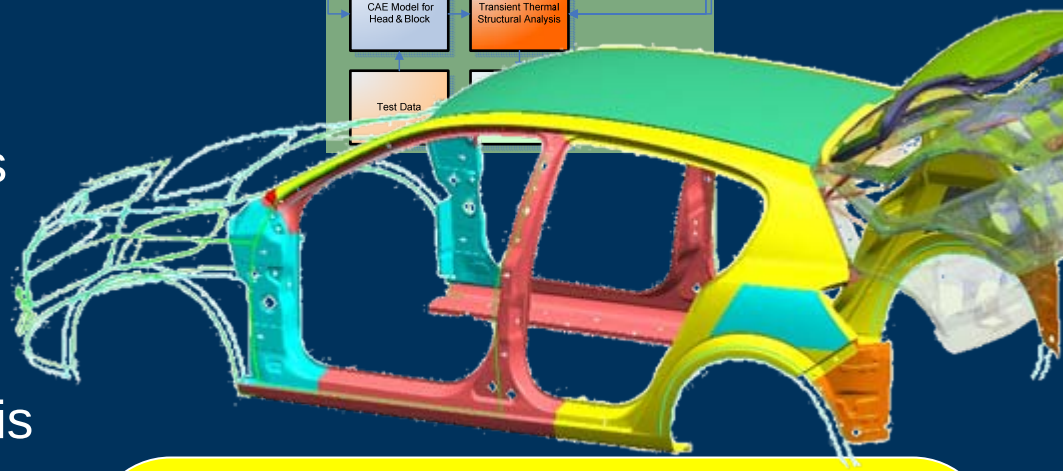
- List of Input Parts
- Parameters (mesh size, quality)
- Ouputs for Nastran Bulk Data, Native pre/post, other solver
- Server or grid computing compatable
- Used in overall simulation process to reduce significant manual interaction for meshing

Block -- 659K Tet 10 Elements 1.6 M nodes; Zero Nastran element quality failures

- Previous time to meshed model ready for solve: ~ 2 wks
- Auto meshed in NX 4 in 2:00 hr

Simulation During Design …
Opel AG

- 80 design engineers trained to use simulation
- Approach used for early evaluation of different variants
  - Dynamic Clearance Analysis
  - Calculation and optimization of joint forces
  - Deflection and stress analysis of simple parts
  - Thermal analysis of exhaust
  - Vibration of simple parts and attachments
- Processes and best practices are easy to automate in NX



"Simulation during design phase saves time (less iteration cycles), improves quality (less mistakes, better security).

"An important side effect of the design time analysis is the fact that the design and the traditional analysis grow closer together and a mutual understanding is fostered,"

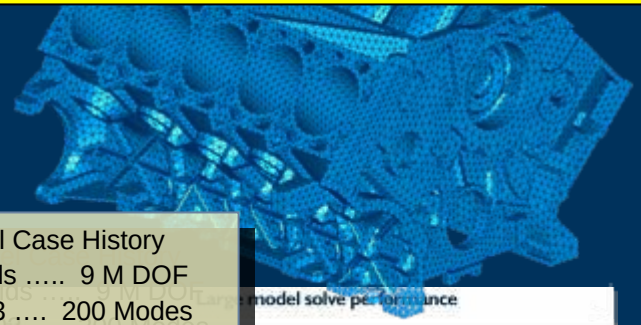
OPEL AG, Germany

NX Nastran

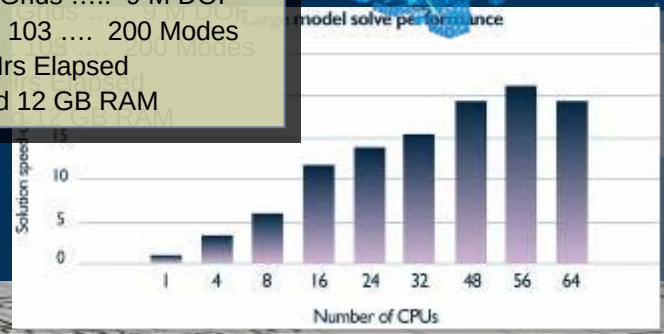
Satisfying the most demanding analysts

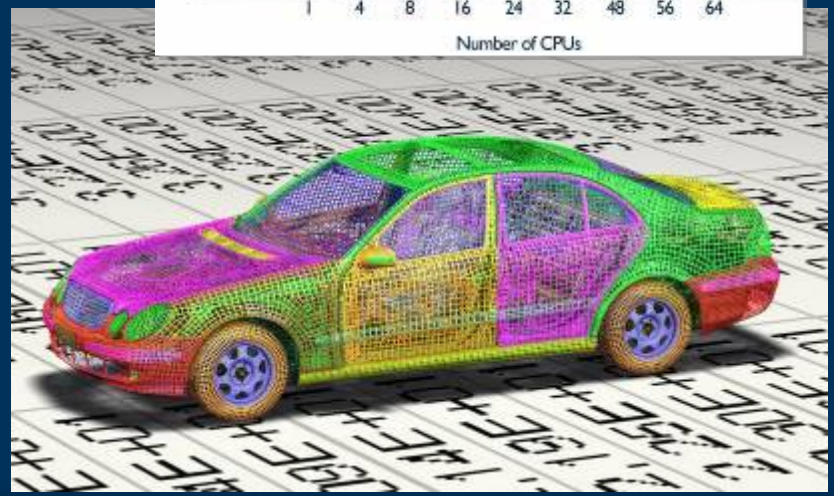
NX Nastran is available to Customer at no additional cost as a replacement for Model Solution

- Nastran is the world's leading solver in its class
  - Performance and accuracy are critical to the Nastran community
    - World's latest hardware; grid computing
    - **UGS leads the competition**
  - Discipline Extensions
    - Nonlinear Analysis
    - Explicit Nonlinear
    - Rotor Dynamics
  - Process improvements
    - Analyst productivity
- Customer led development is being rewarded by continued sales momentum

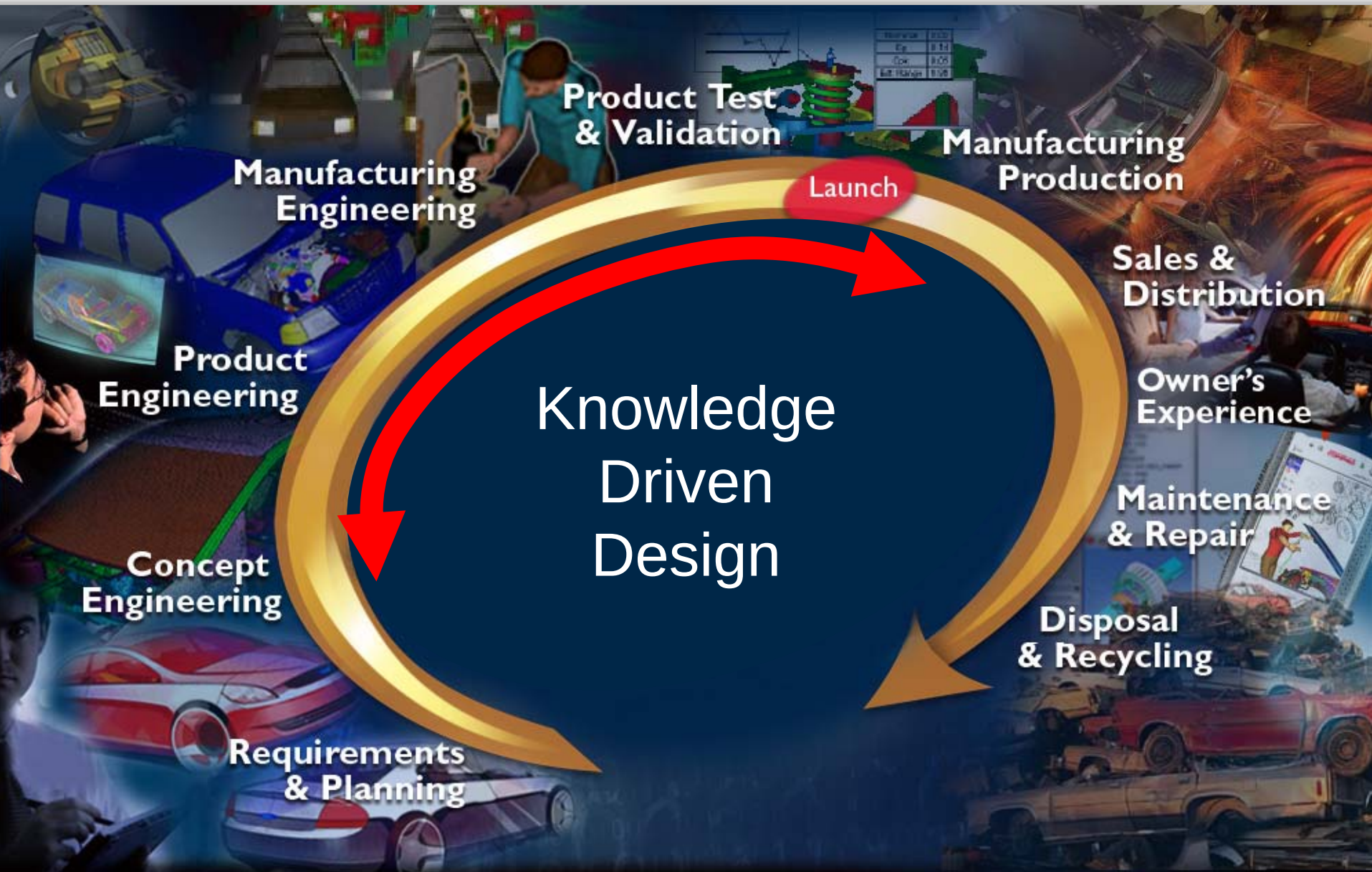


Engine Model Case History
- 3 M Grids ….. 9 M DOF
- SOL 103 …. 200 Modes
- 10 Hrs Elapsed
- Used 12 GB RAM



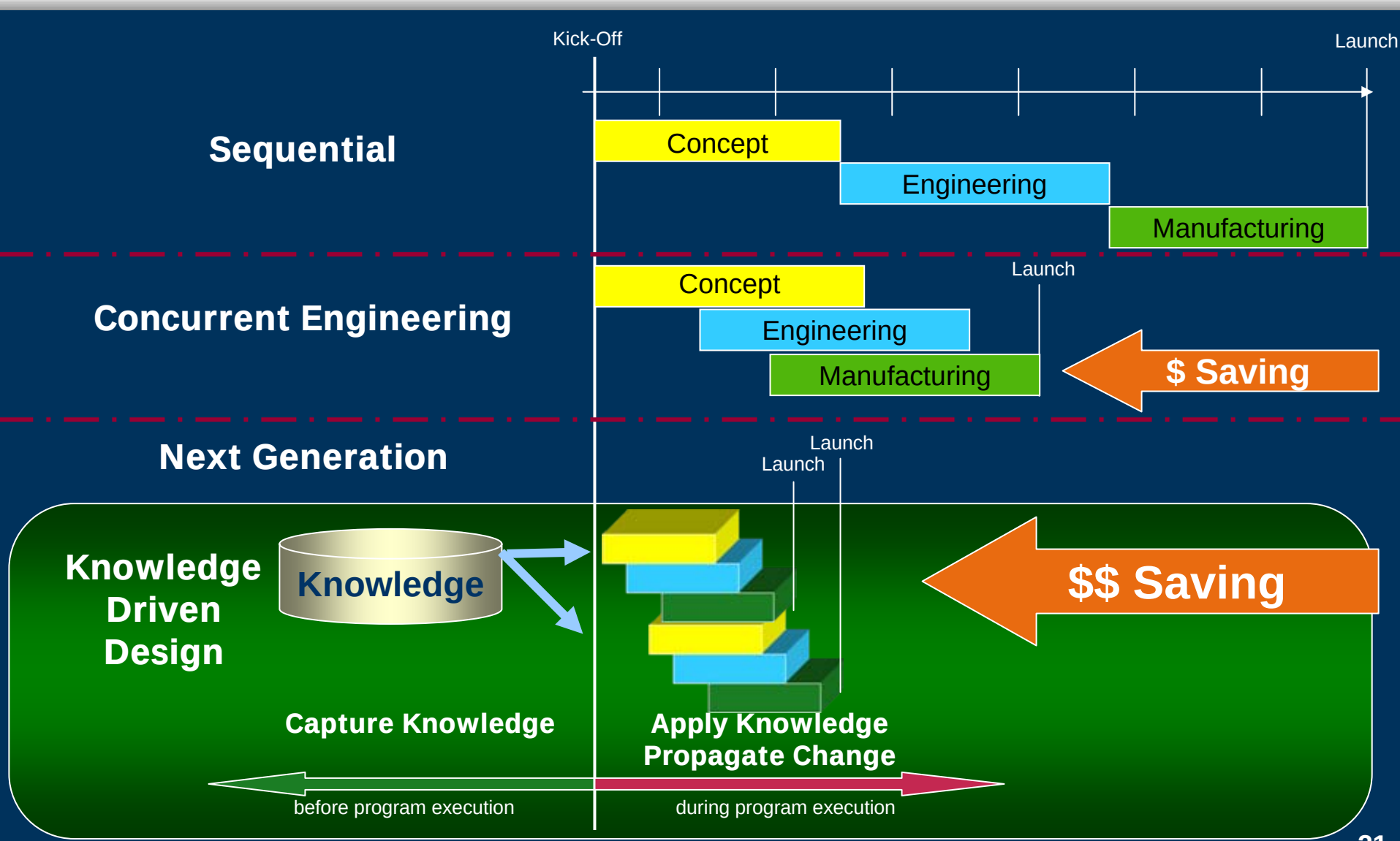


Vehicle Development Lifecycle



Knowledge Driven Design

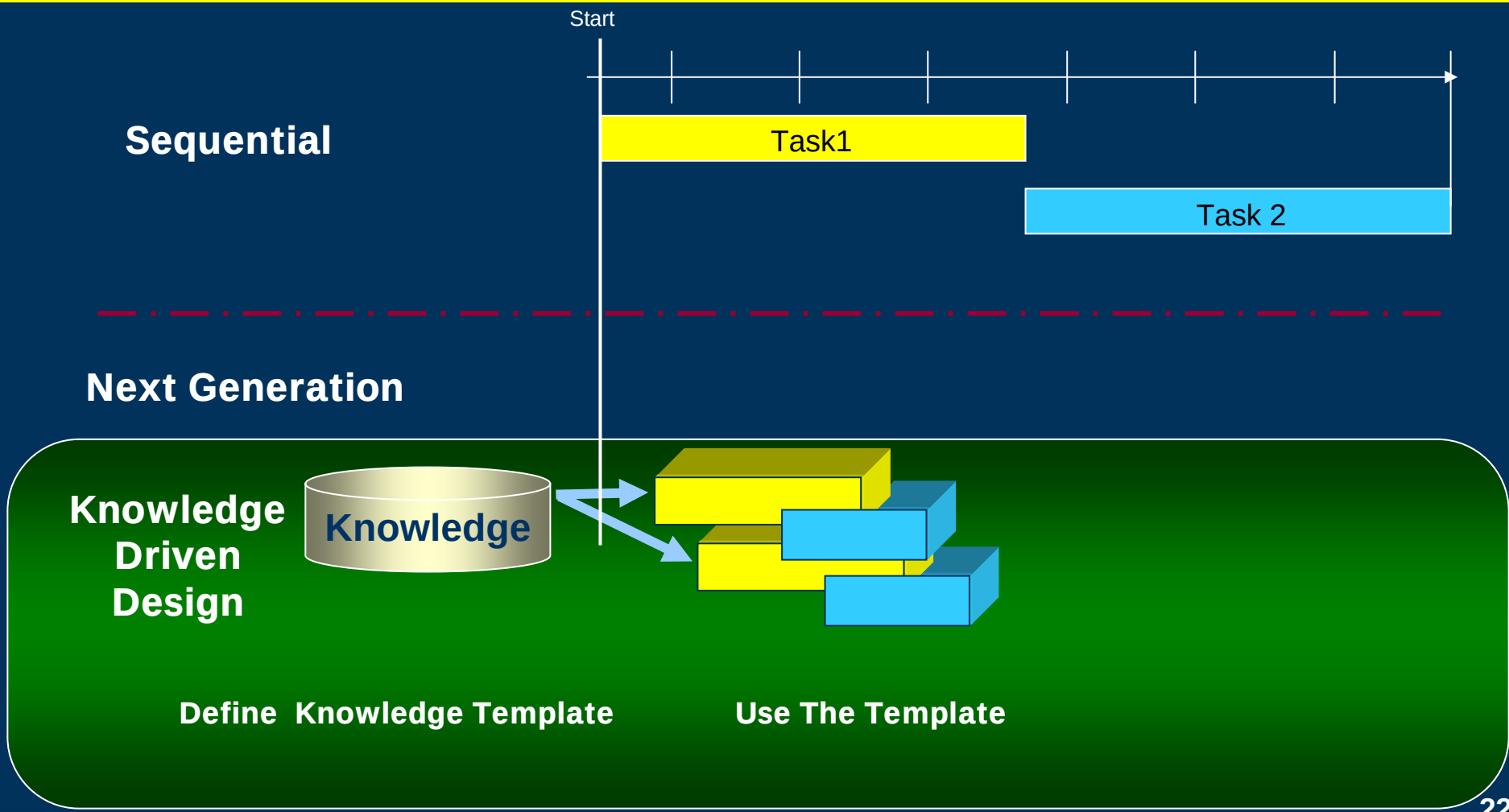
Strategy and Direction



Knowledge Driven Design

Template Based Modeling

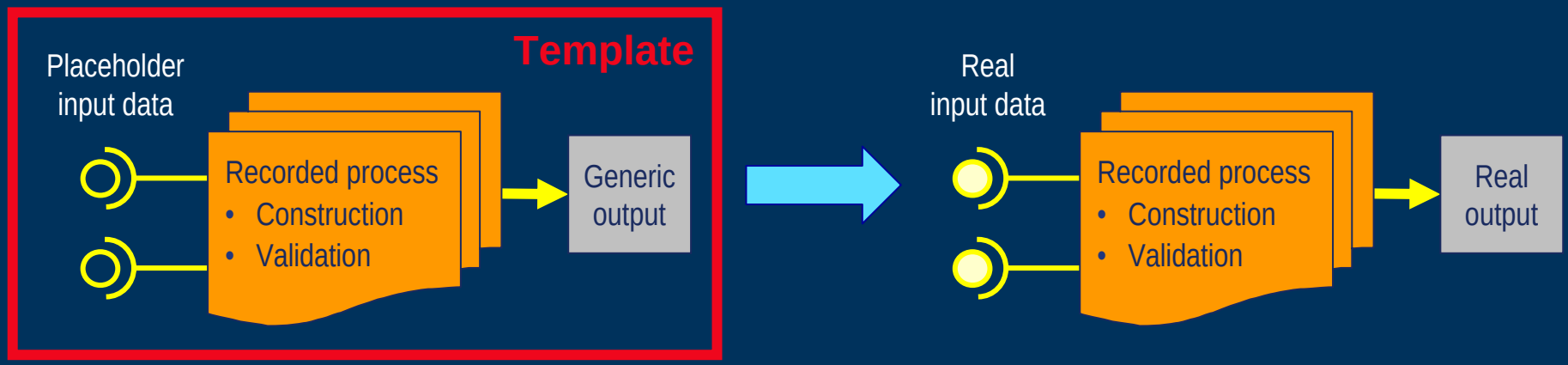
Capture vehicle development knowledge in re-usable "templates" that provide a jump-start for new programs



Knowledge Driven Design

Template Based Modeling

Capture vehicle development knowledge in re-usable "templates" that provide a jump-start for new programs



Develop the Template **Use the Template**

Template Possibilities are known and understood systems:

- Suspension setup
- Chassis layout and nodes
- Body Panel Joints
- Packaging studies
- Door/Body Side Relationship
- Base Engine
- Drive train
- Ancillaries

Why this is of value to Customer?

- Fast use of pre-defined systems

Benefit opportunity;

- More design iterations
- Increased design capacity
- Higher quality through repeatability
- Lower design costs through reuse

Knowledge Driven Design

NX Template Modeling Example

Library of Templates

Body Design

Prior door designs and templates

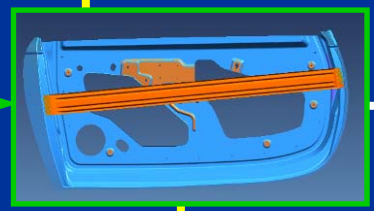
Tooling and NC

Prior tooling designs and templates

New Vehicle Program

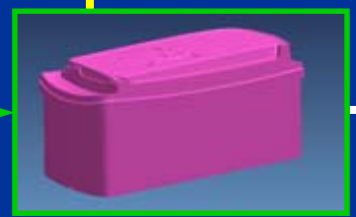
Further changes

Replay existing door inner design with new styling data as input



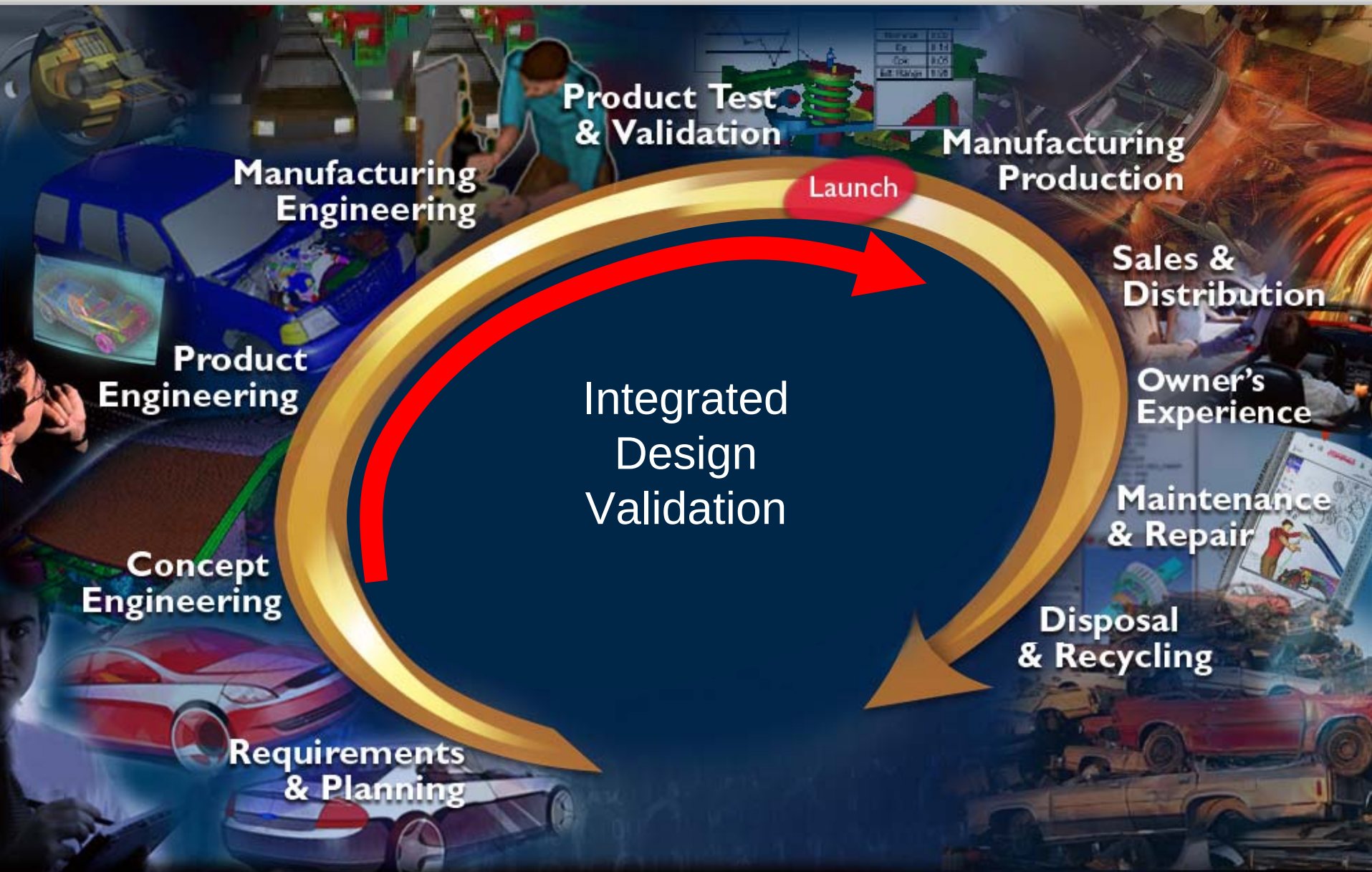
Further changes

Replay existing die design with new door inner as input



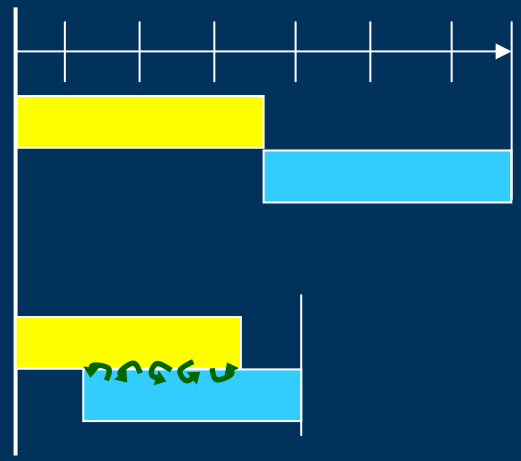
Further changes

Vehicle Development Lifecycle



Integrated Design Validation?

What is Integrated Design Validation?



Automated Checking of

- Product data quality (from suppliers)
- Company Standards
- Of design against requirements
- …

Why Integrated Design Validation?

- Concurrency means there is less time to check manually
- More design iterations means more checks

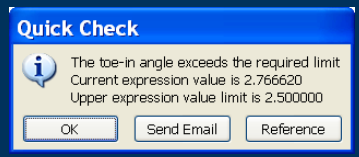
Integrated Design Validation

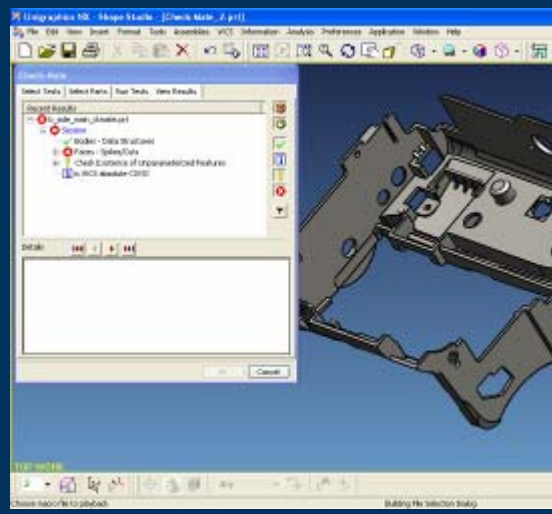
Value to Customer

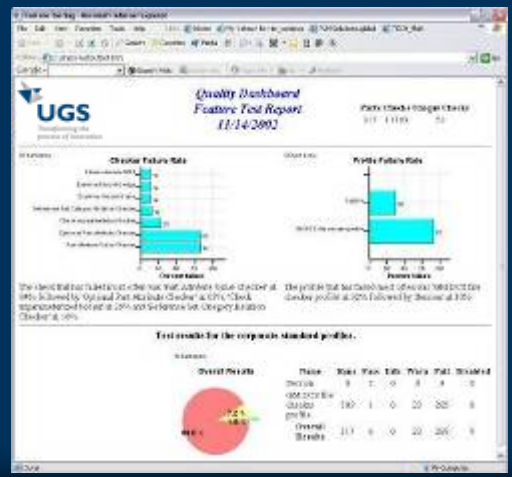
- Validate supplier data to Customer standards
- Catch errors earlier and reduce change risk
- Link product validation with requirements
- Educate less experienced designers / engineers

Technology Enablers

- Automatically trigger/enforce validations at appropriate times like part save, part release, etc. (Check-Mate, Teamcenter Validation Objects)
- Embed validations to make designs smarter and guide usage (Quick Check)
- Link validations in NX to requirements from external sources (Excel spreadsheets, Teamcenter Requirements, XML, etc.)
- Collect metrics and create reports based on validation results (Quality Dashboard)







Integrated Design Validation

Manufacturing Validation

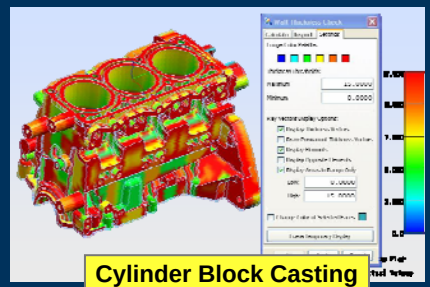
Automotive Business Challenges

- Too little manufacturability validation taking place early in the design process
- Designers need manufacturability education

Technology Enablers

- OOtB manufacturability validation tools enable frequent checking and guide designers
  - Wall thickness checker for cast parts
  - Sheet metal DFM advisor
  - Draft analysis for molded/cast parts
  - Many others…
- Easy-to-use tools guide and educate designers
  - High performance and precise results
  - Easy-to-interpret results

Transmission Casting



Cylinder Block Casting

Body Sheet Metal Parts

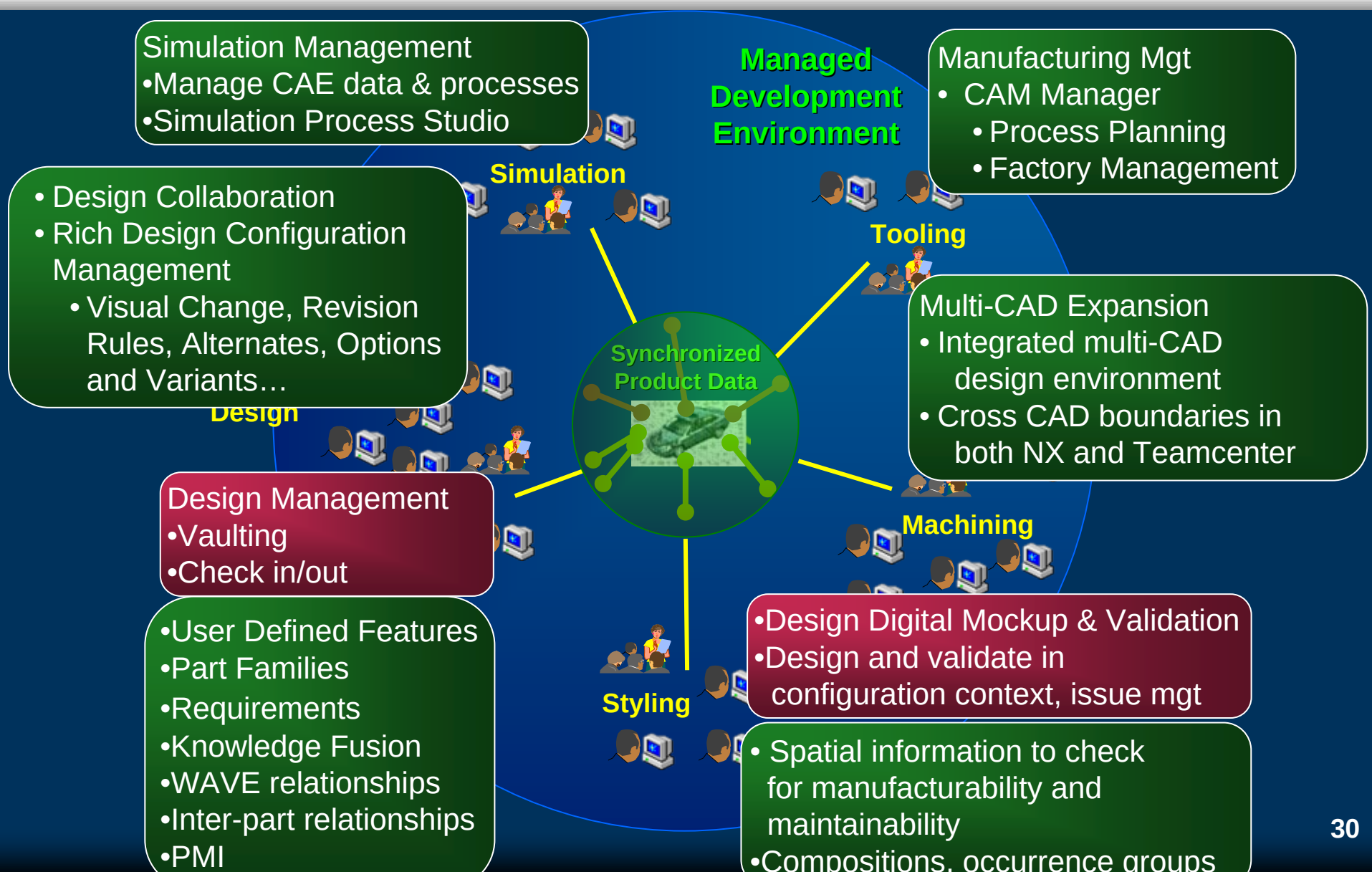
"By using NX molded part validation, we reduced the time to analyze wall thicknesses of complicated parts from a range of 3 to 10 days to less than 1 day, while also improving accuracy for identifying potential design issues."

Ben Yadao, Engineer
International Truck and Engine Corporation

Managed Development Environment

NX Managed Development Environment

NX and Teamcenter are scalable and functionally rich



Summary

- Robust migration from I-deas to NX native models
  - E.g. model history, sketches, reference geometry, associative drawings, assembly contraints, PMI, …
- Nissan selected NX as their next generation system after proving the technology through exhaustive benchmarking
- NX offers best in class capabilities for the complete vehicle
  - E.g. A-class creation / visualization, Body CAD creation, Powertrain, Electrical harness design, Knowledge Based Engineering, Simulation

Moving to NX is Low Risk, Low Cost, High Value