

IDEAS to NX : A Successful Experience

Author : Mr. Prashant P. Kamat
Company : Mahindra Engineering
Email : kamat.prashant@mahindra.com
Phone : +91- 202 545 9782

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- Mahindra Engineering capability matrix
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- Case study - Migration vs. Re-mastering
- NX functionality comparison with I-deas12
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- Mahindra Engineering – company overview

ME resource Logistics – Softwares

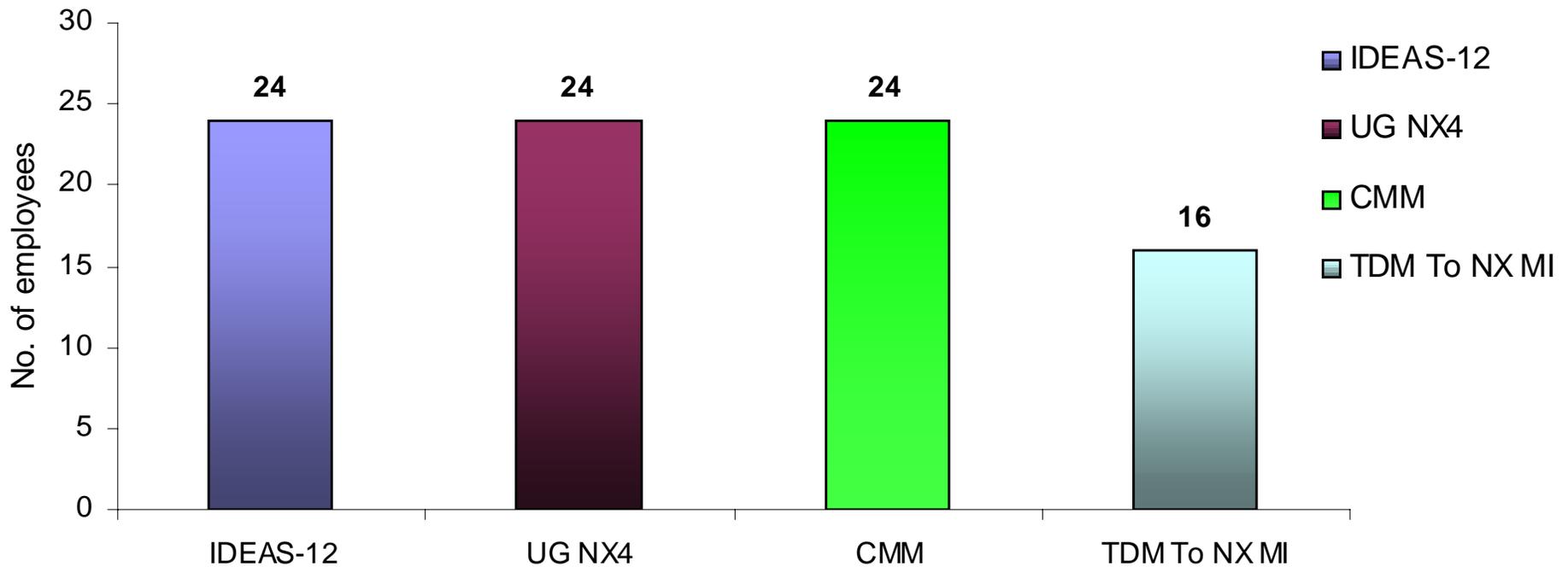
Softwares

- UG NX
- IDEAS
- Team Center Engineering
- Team Center Engineering
- Team Center Portal LSE
- Oracle
- NX manager for IDEAS

Version

3,4
11,12
9.1.2.0
9.1.3.0
9.1
9i
4.1

Mahindra Engineering Capability Matrix

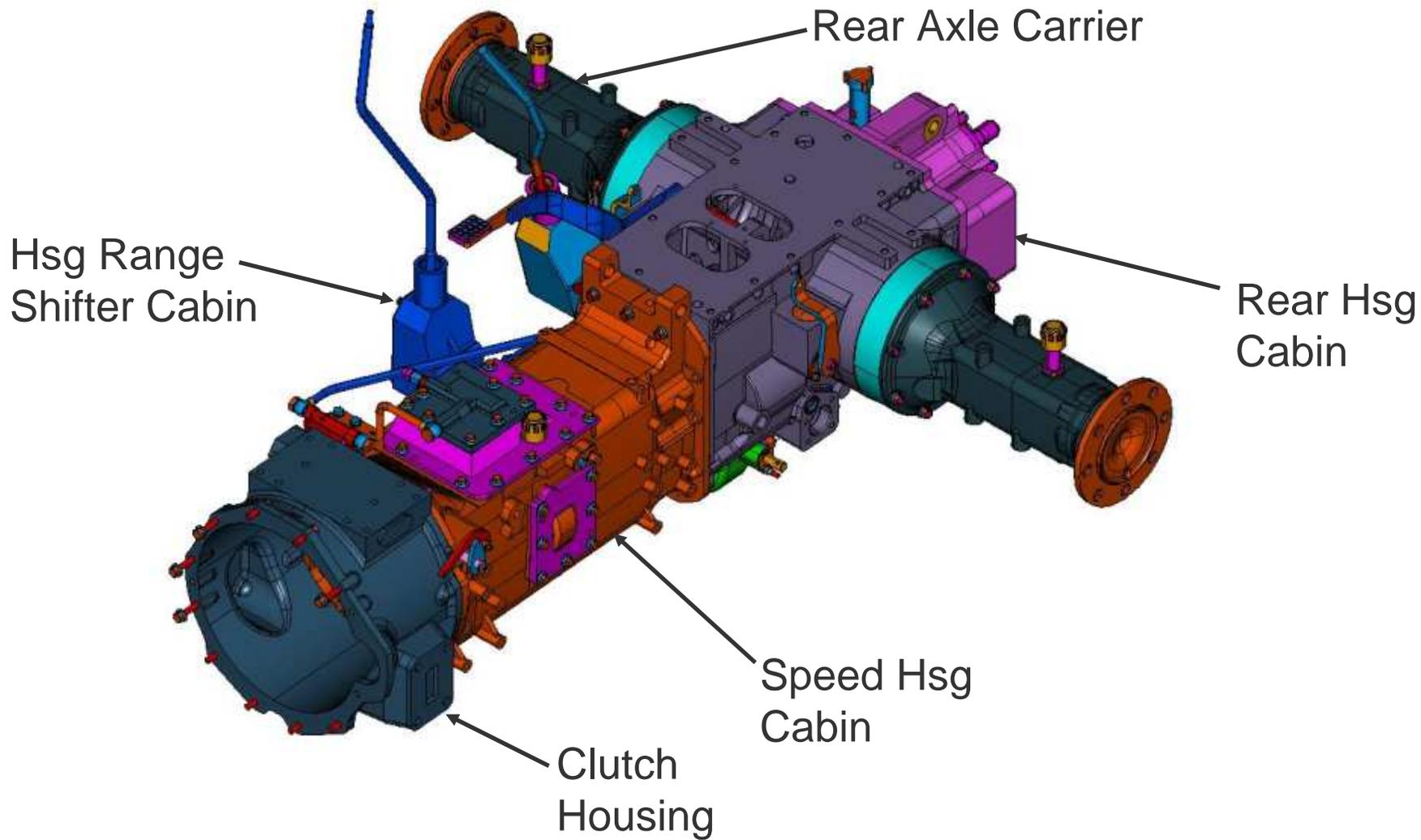


Total no. of employees: 24

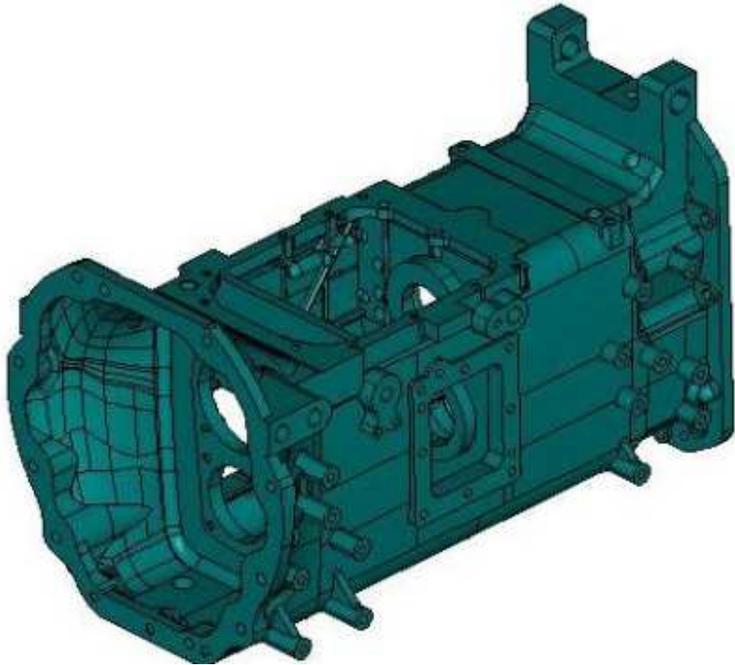
Key Test Projects Executed

- Tractor assembly and components
- Engine assembly and components
- Software applications used
 - IDEAS-12
 - UG NX4

Tractor Assembly



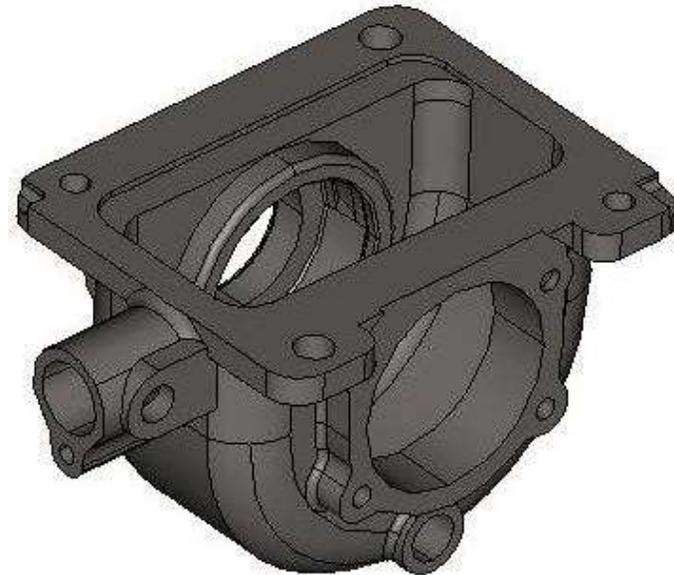
Major Tractor Assembly Components Migrated Successfully



Speed Housing

File Size in IDEAS-12 - 20.5 MB

File Size in UG NX4 - 23.2 MB

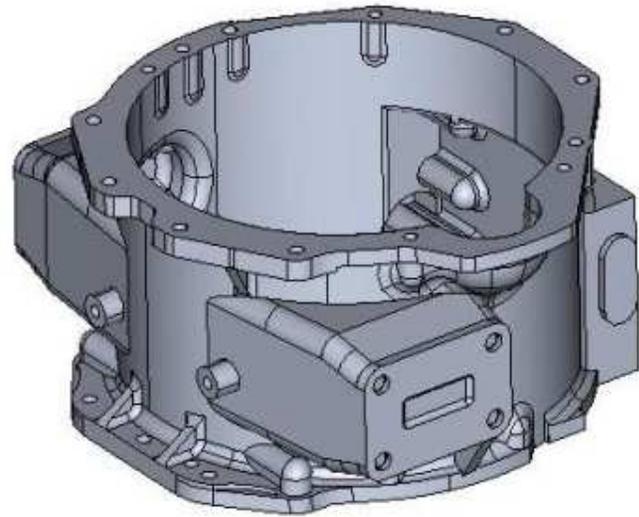


4WD Transfer Case

File Size in IDEAS-12 - 2.51 MB

File Size in UG NX4 - 3.1 MB

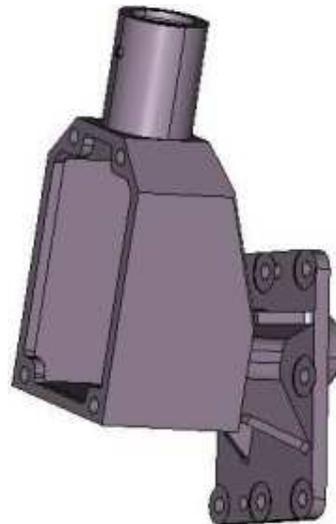
Major Tractor Assembly Components Migrated Successfully contd..



Clutch Housing

File Size in IDEAS-12 - 8.08 MB

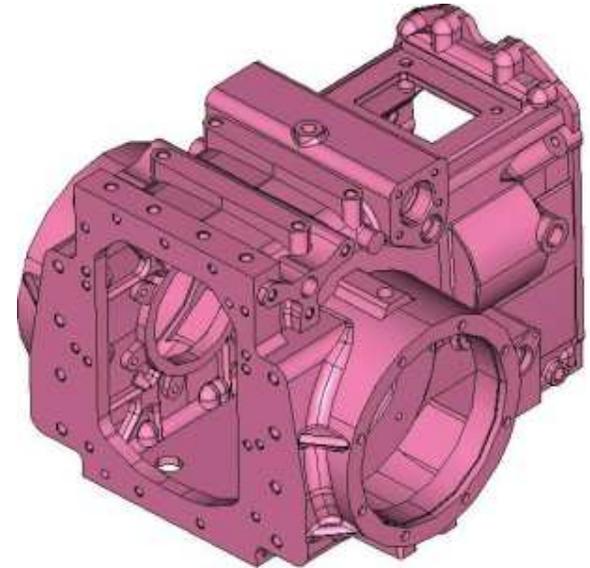
File Size in UG NX4 - 8.82 MB



Range Shifter

File Size in IDEAS-12 - 1.48 MB

File Size in UG NX4 - 2.66 MB

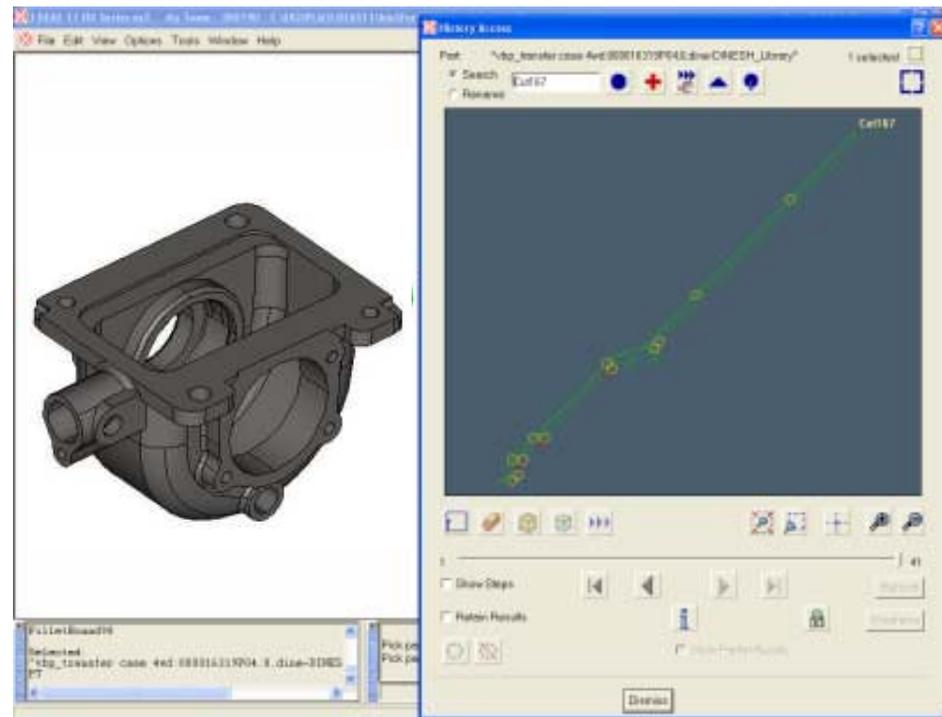


Rear Housing

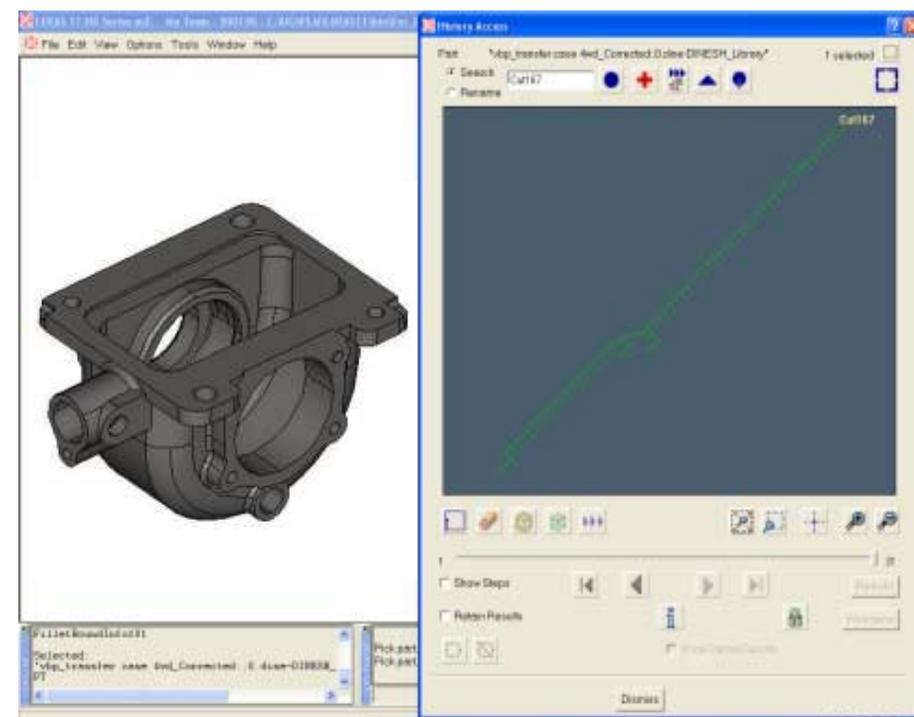
File Size in IDEAS-12 - 21.0 MB

File Size in UG NX4 - 23.5 MB

Part Migration – 4WD Tractor Transfer Case

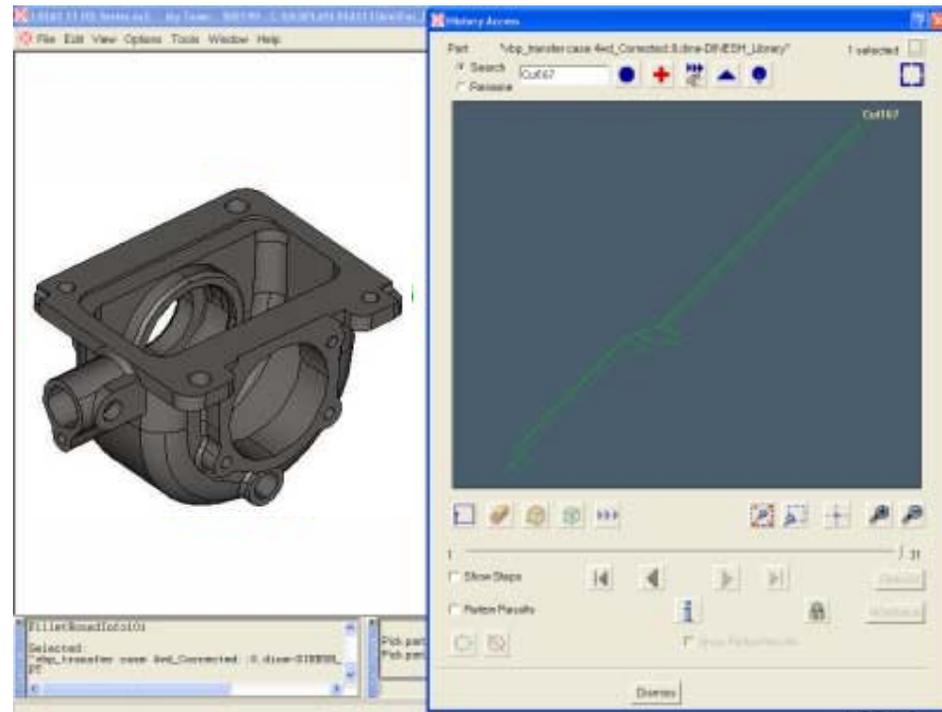


Before fixing yellow and red nodes in IDEAS-12

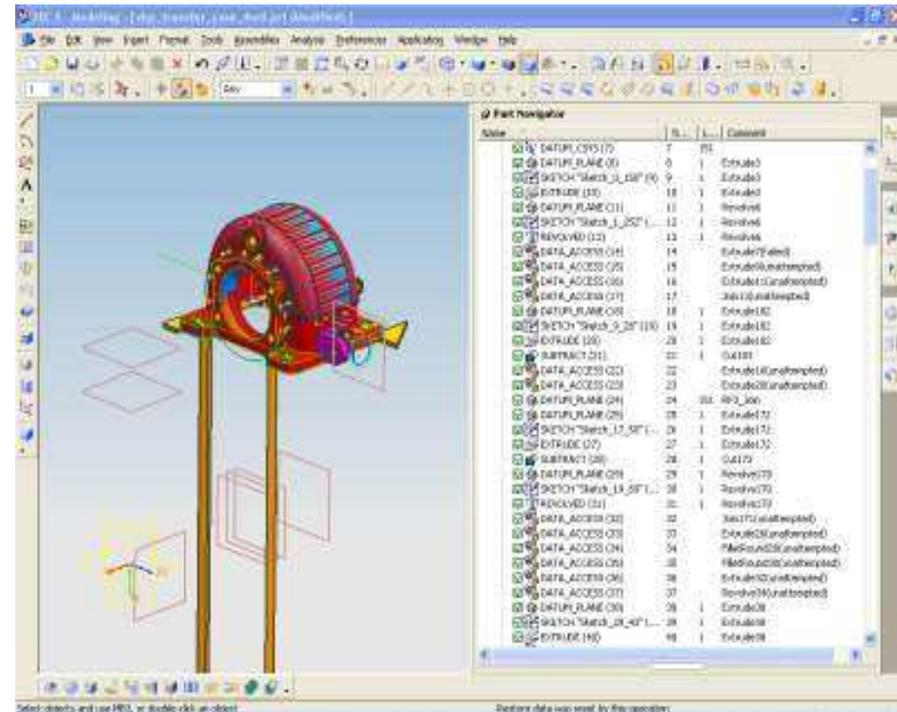


After fixation in IDEAS-12 (5 hrs)

Part Migration – 4WD Transfer Case (Team Center/CMM)

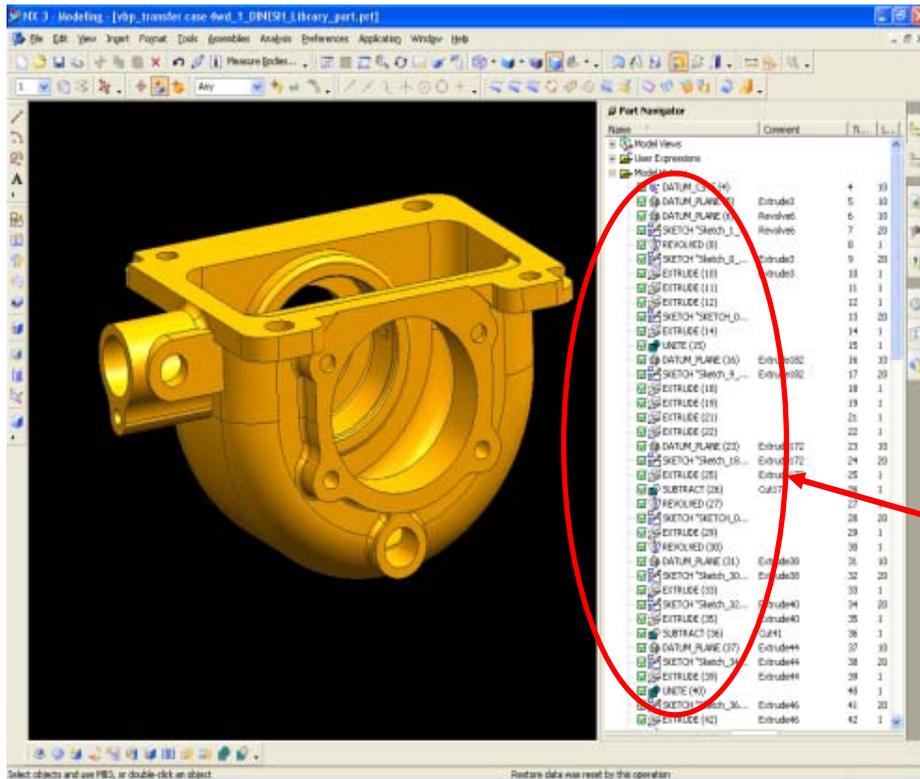


Error free part in IDEAS-12 before migration



Part after migration to UG NX4

Part Migration – 4WD Tractor Transfer Case (Team Center/CMM)

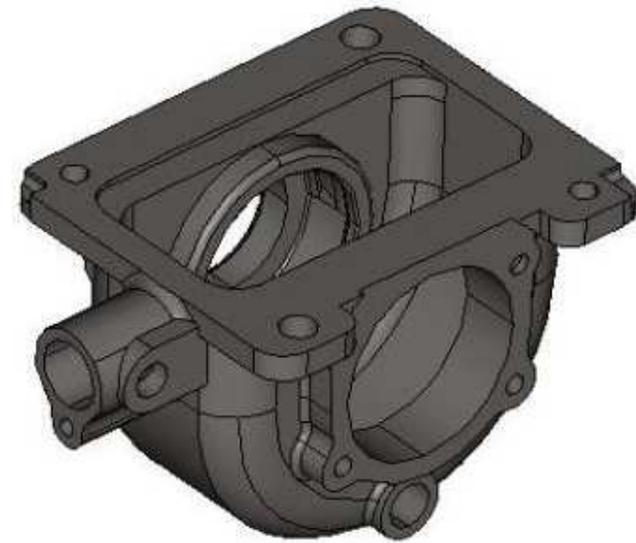


Clean history in UG NX4
Hours spent : 3

Fixing in UG NX4

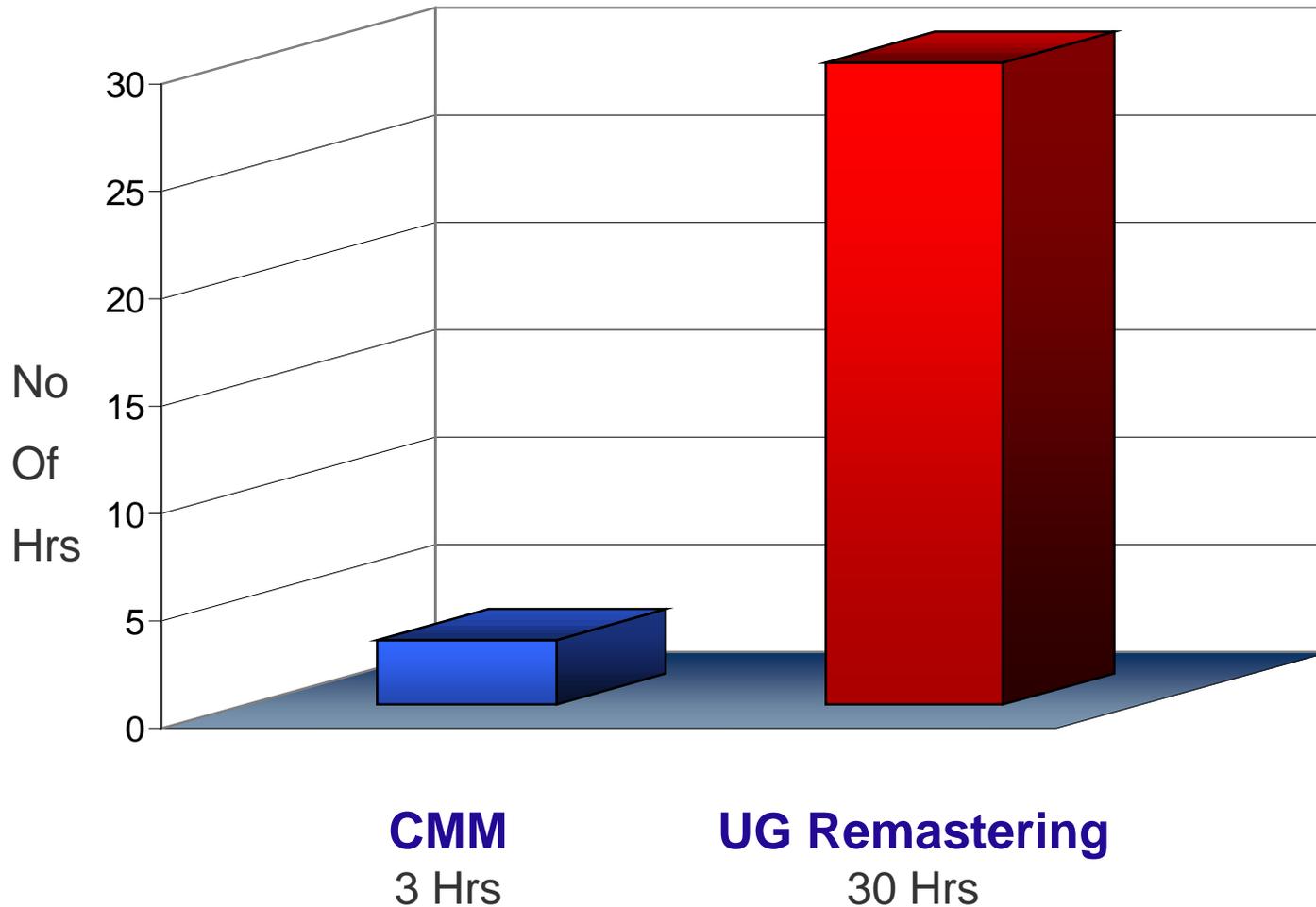
Tractor Assembly Part File Size During Each Migration Stage (CMM)

- While importing in IDEAS-12 - 2.56 MB (956065 mm³)
- After fixing in IDEAS-12 - 2.51 MB (952199 mm³)
- After migration to UG NX4 - 14 MB
- After fixing in UG NX4 - 3.1 MB (955987 mm³)

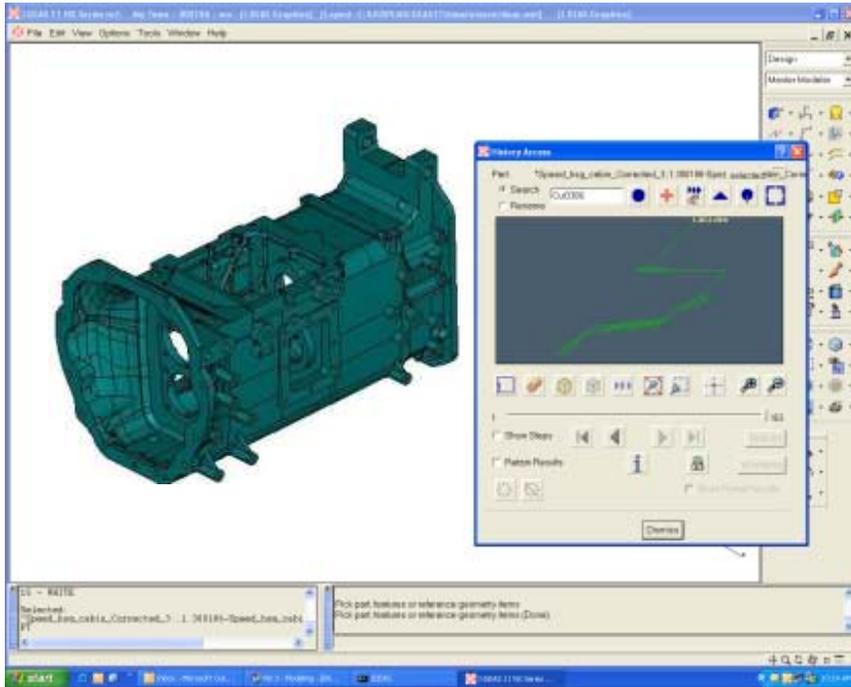


4WD Transfer Case

Time Comparison For 4WD Transfer Case Error Fixing in UG NX4



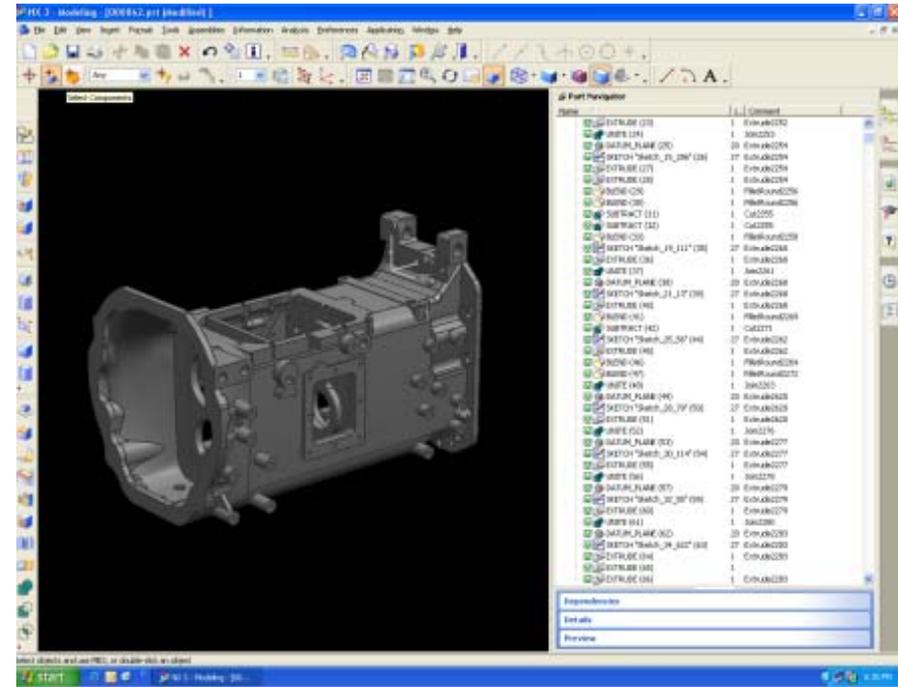
Time Comparison for Speed Housing Migration



IDEAS-12 Error Free Part

CMM

Fixing Time
48 Hrs

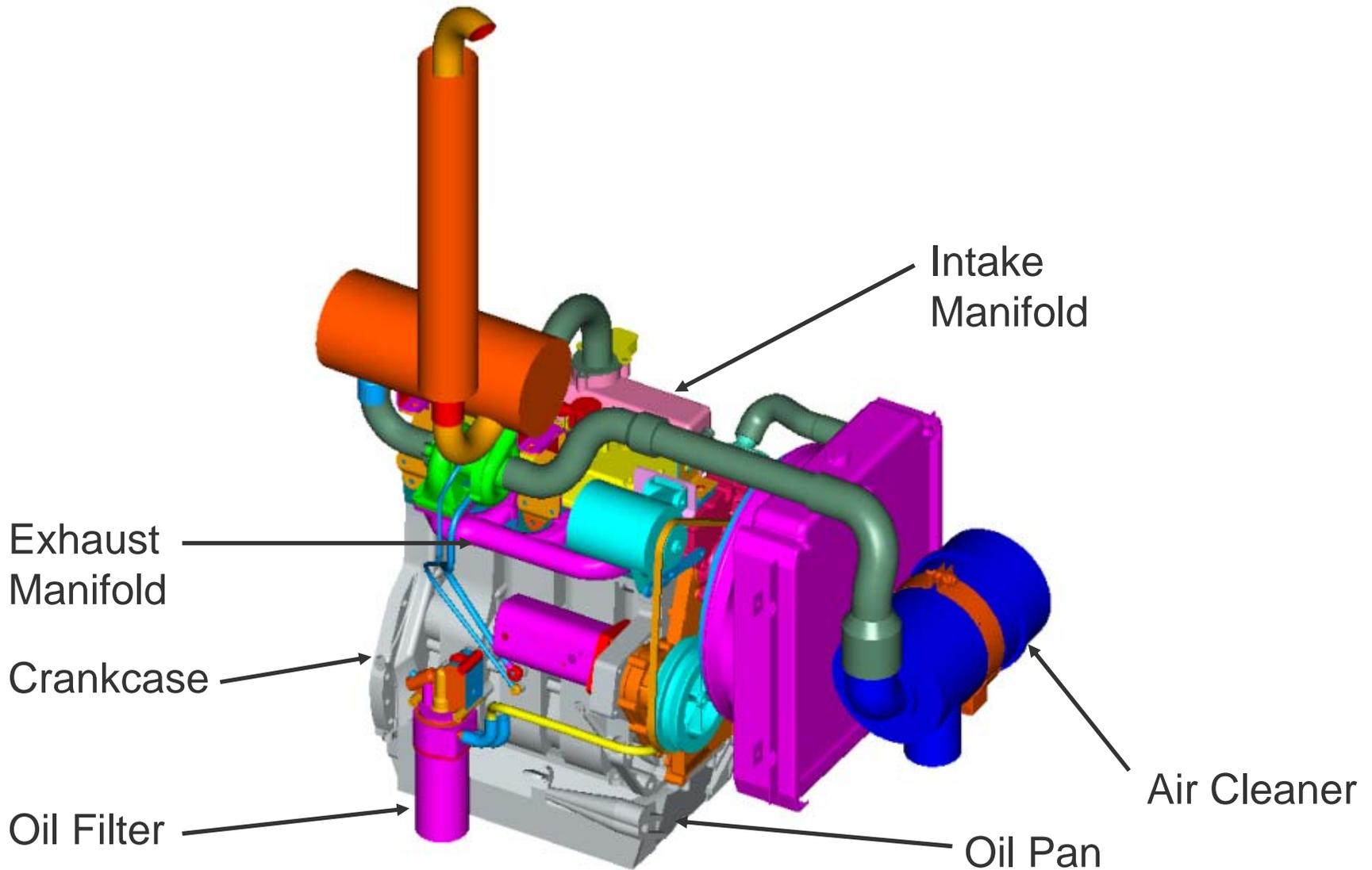


Fixing in UG NX4

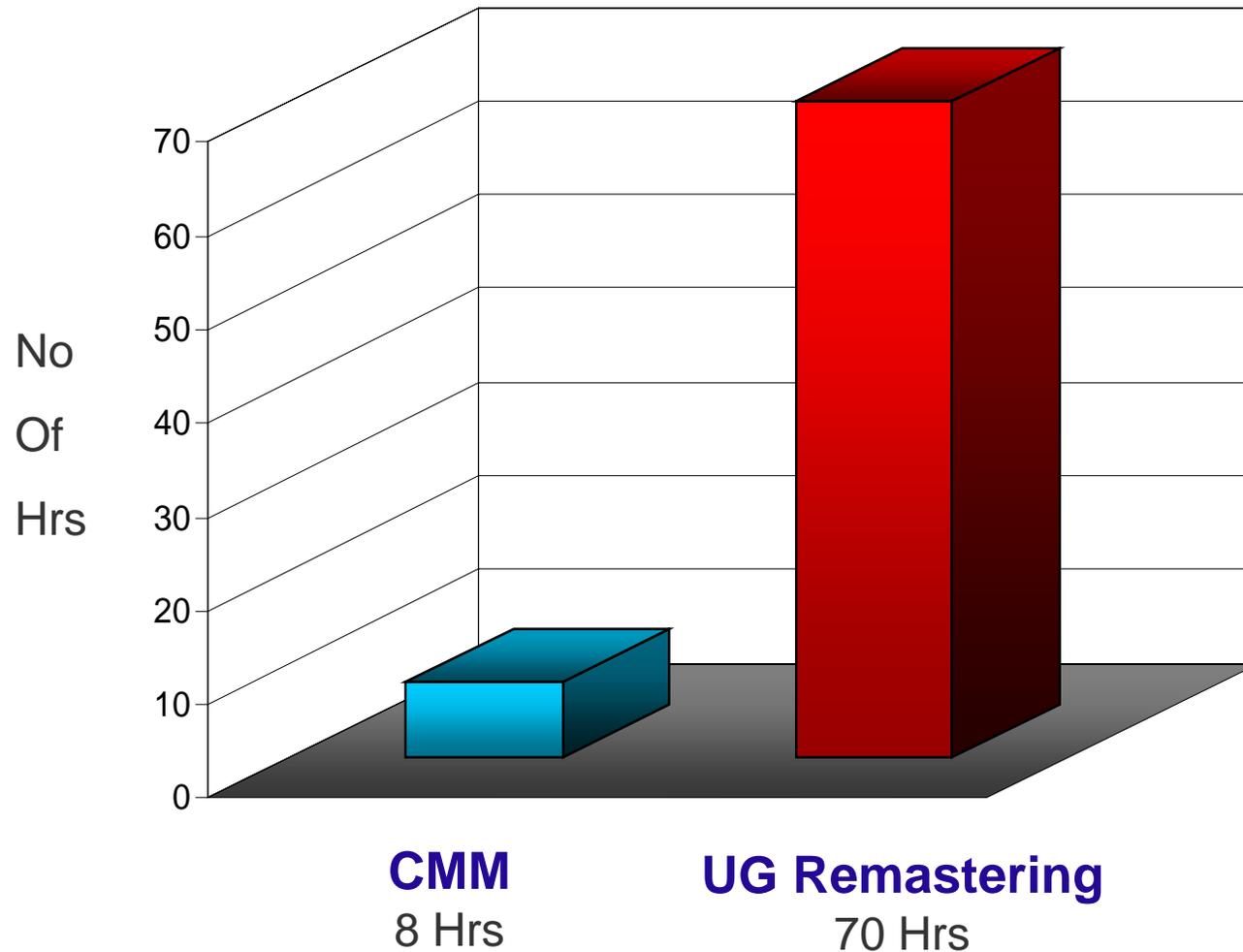
UG NX4 Remastering

400 Hrs

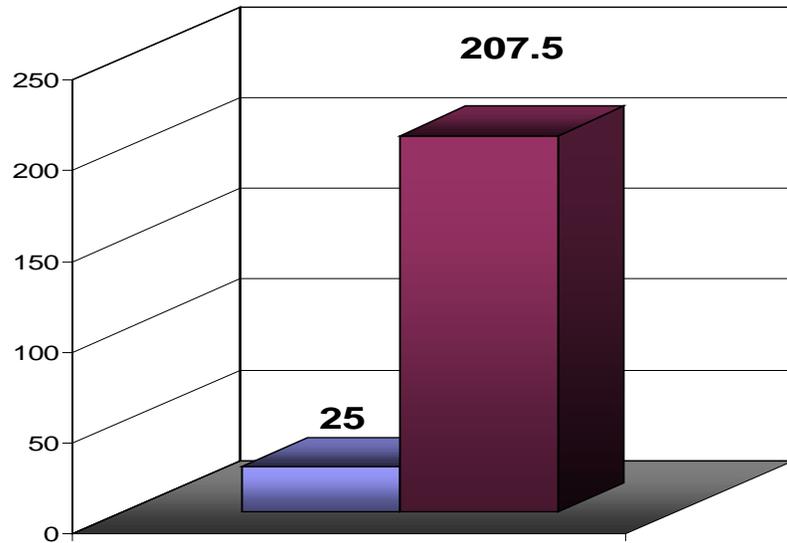
Tractor Engine Assembly



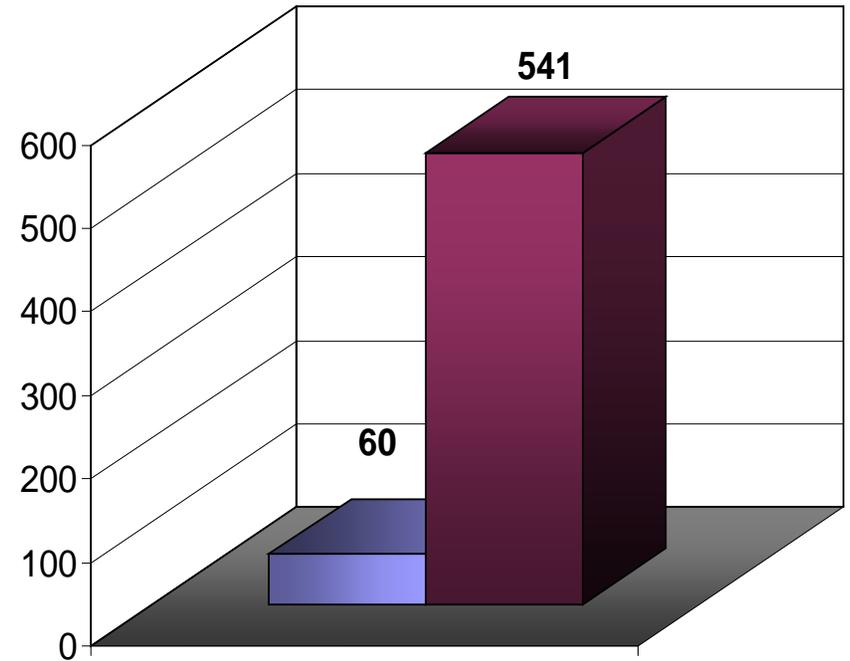
Time Comparison For Intake Manifold Error Fixing in UG NX4



Time Comparison between Small and Big Parts - An analysis



(Less than 10Hrs.)
Sample size: 53 parts



(More than 10Hrs.)
Sample size: 2 parts

UG MIGRATED

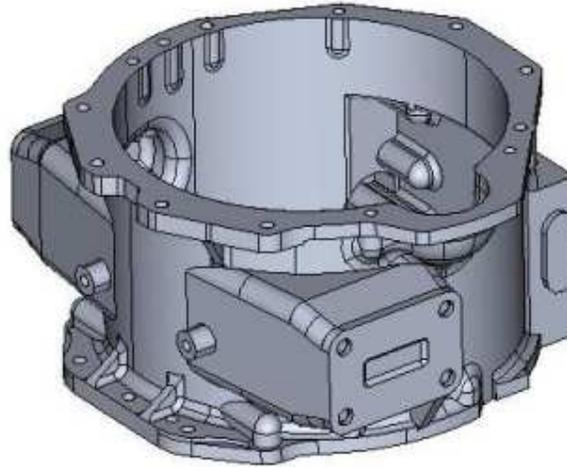
UG CREATED

Case Study

Migration & Remastering Comparison Matrix

SR NO	DESCRIPTION	UG Re-mastering Time (hrs)	CMM 4 / NX-4 UG Fixing Time (hrs)	IDEAS-12 File Size (Mb)	CMM 4 / NX-4 Error Fixing With B-REP UG File Size (Mb)
1	AIR CLEANER BRACKET	10.0	2.0	2.99	1.88
2	INTAKE MANIFOLD	70.0	8.0	3.82	5.44
3	PIPE METALLIC BETWEEN IM & HOSE	8.0	2.0	0.48	1.10
4	CYLINDER HEAD	340.0	48.0	16.80	21.50
5	EXHAUST MANIFOLD	40.0	7.0	4.02	7.20
6	FUEL FILTER	30.0	4.0	3.19	6.44
7	GLOW PLUG	5.0	1.0	0.31	0.43
8	OIL FILTER BRACKET	16.0	3.5	1.40	1.94
9	RADIATOR ASSEMBLY 2ROW	16.0	3.0	2.99	4.07
10	CONNECTING ROD	22.0	3.0	2.09	6.22
11	CRANKSHAFT 4 CYL.	50.0	6.0	3.03	5.08
12	PISTON	22.0	3.5	1.73	3.45
13	HSG DUAL PTO	120.0	23.0	6.38	6.46
14	CLUTCH HOUSING	120.0	15.0	8.08	8.82
15	DIFFLOCK PEDAL SPLIT	10.0	2.0	1.05	1.18
16	REARAXLE CARRIER	45.0	8.0	2.46	6.97
17	RANGE SHIFTER HOUSING	30.0	4.0	1.48	2.66
18	REAR HOUSING	450.0	60.0	21.00	23.50
19	SPEED HOUSING	400.0	48.0	20.50	23.20
20	BRIJ NDC OIL PUMP	60.0	8.0	3.16	5.60
21	COVER SPEED SHIFTER WINDOW	10.0	2.0	0.94	1.76
22	MAGNETIC DRAIN PLUG	5.5	2.0	0.30	0.55
23	4WD TRANSFER CASE	30.0	3.0	2.50	3.10

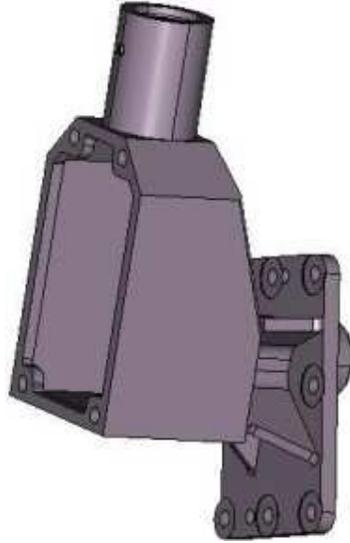
Case Study (e.g.) Migration & Remastering Comparison Matrix



Clutch Housing

UG NX4 Remastering Time (hrs)	CMM Fixing Time (Hrs)	IDEAS-12 File Size (Mb)	CMM Error Fixing with B- REP File Size (Mb)	CMM Error Fixing with No B-REP File Size (Mb)	UG NX4 Part Volume (mm ³)	IDEAS-12 Part Volume (mm ³)
120	15	8.08	8.82	8.01	7.567293 E+6 mm ³	7.5661 E+6 mm ³

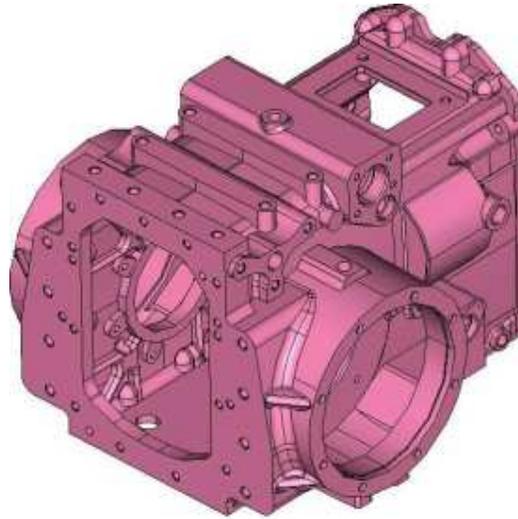
Case Study (e.g.) Migration & Remastering Comparison Matrix



Range Shifter Housing

UG NX4 Remastering Time (hrs)	CMM Fixing Time (Hrs)	IDEAS-12 File Size (Mb)	CMM Error Fixing with B- REP File Size (Mb)	CMM Error Fixing with No B-REP File Size (Mb)	UG NX4 Part Volume (mm ³)	IDEAS-12 Part Volume (mm ³)
30	4	1.48	2.66	1.47	0.785637 E+6 mm ³	0.784902 E+6 mm ³

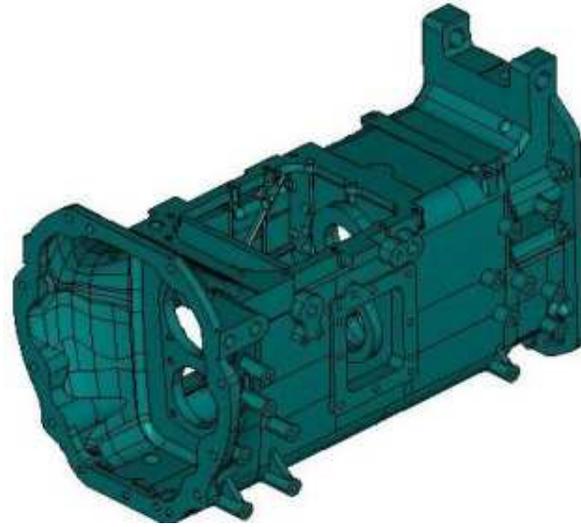
Case Study (e.g.) Migration & Remastering Comparison Matrix



Rear Housing

UG NX4 Remastering Time (hrs)	CMM Fixing Time (Hrs)	IDEAS-12 File Size (Mb)	CMM Error Fixing with B- REP File Size (Mb)	CMM Error Fixing with No B-REP File Size (Mb)	UG NX4 Part Volume (mm ³)	IDEAS-12 Part Volume (mm ³)
450	60	21	23.5	21.02	18.39708 E+6 mm ³	18.398 E+6 mm ³

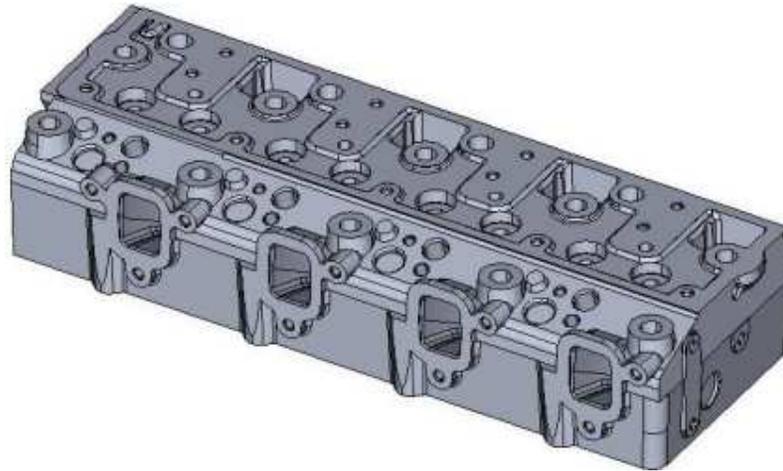
Case Study (e.g.) Migration & Remastering Comparison Matrix



Speed Housing

UG NX4 Remastering Time (hrs)	CMM Fixing Time (Hrs)	IDEAS-12 File Size (Mb)	CMM Error Fixing with B- REP File Size (Mb)	CMM Error Fixing with No B-REP File Size (Mb)	UG NX4 Part Volume (mm ³)	IDEAS-12 Part Volume (mm ³)
400	48	20.5	23.2	26.22	12.117768 E+6 mm ³	12.2642 E+6 mm ³

Case Study (e.g.) Migration & Remastering Comparison Matrix



Cylinder Head

UG NX4 Remastering Time (hrs)	CMM Fixing Time (Hrs)	IDEAS-12 File Size (Mb)	CMM Error Fixing with B- REP File Size (Mb)	CMM Error Fixing with No B-REP File Size (Mb)	UG NX4 Part Volume (mm ³)	IDEAS-12 Part Volume (mm ³)
340	48	16.8	21.5	14.8	6.24926 E+6 mm ³	6.25067 E+6 mm ³

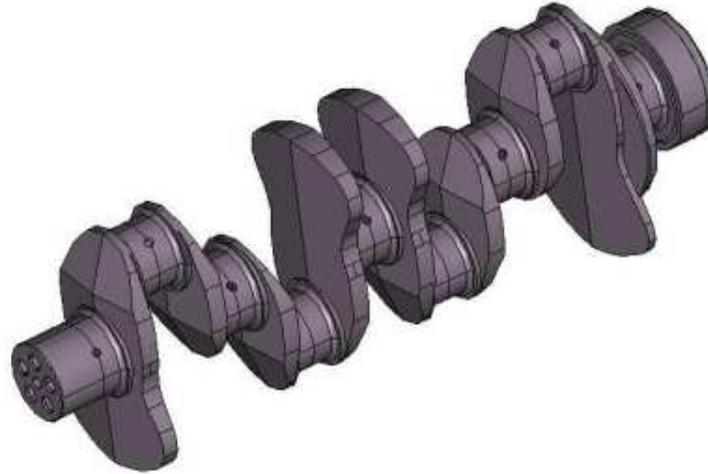
Case Study (e.g.) Migration & Remastering Comparison Matrix



Connecting Rod

UG NX4 Remastering Time (hrs)	CMM Fixing Time (Hrs)	IDEAS-12 File Size (Mb)	CMM Error Fixing with B- REP File Size (Mb)	CMM Error Fixing with No B-REP File Size (Mb)	UG NX4 Part Volume (mm ³)	IDEAS-12 Part Volume (mm ³)
22	3	2.09	6.22	2.14	0.125084 E+6 mm ³	0.125158 E+6 mm ³

Case Study (e.g.) Migration & Remastering Comparison Matrix



Crankshaft

UG NX4 Remastering Time (hrs)	CMM Fixing Time (Hrs)	IDEAS-12 File Size (Mb)	CMM Error Fixing with B- REP File Size (Mb)	CMM Error Fixing with No B-REP File Size (Mb)	UG NX4 Part Volume (mm ³)	IDEAS-12 Part Volume (mm ³)
50	6	3.03	5.08	4.26	2.627023 E+6 mm ³	2.62731 E+6 mm ³

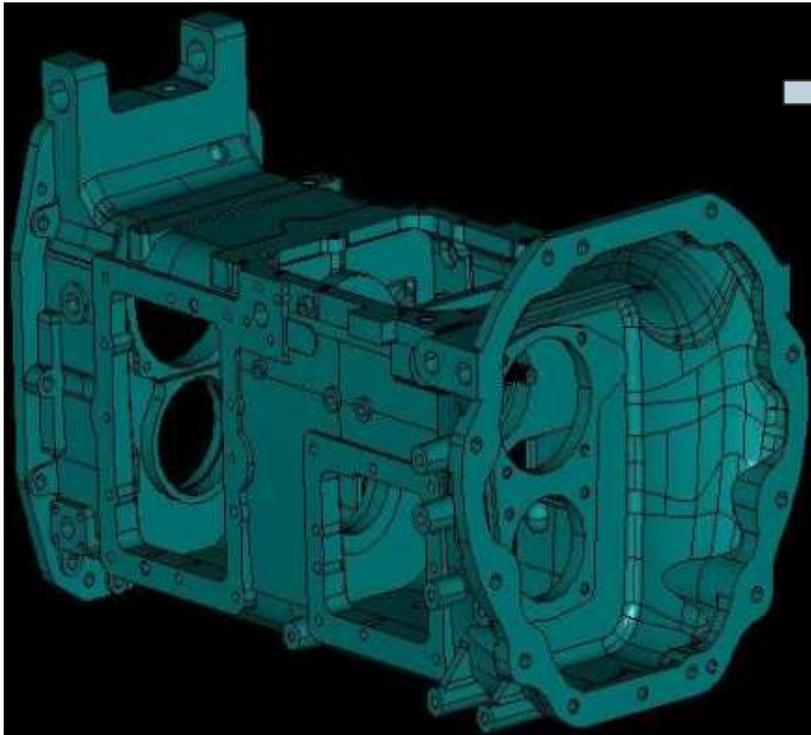
NX Functionality compare with IDEAS-12

	Function	IDEAS-12	UG NX4
1	Edit feature	Hidden command	Easy by double clicking on part feature
2	Reorder of feature	Difficult	Easy by dragging in part navigator
3	Undo	One step undo	Featureless Undo is possible
4	Layer	Present only in drafting	Present in modeling & drafting
5	History accessibility	Separate command to access History	Always visible and easily accessible
6	History Structure	Bushy (Sometimes diff to understand)	Linear
7	Fillet	Animated GUI not available	Available
8	Chamfer	Animated GUI not available	Available
9	Shell	Animated GUI not available	Available
10	Draft	Animated GUI not available	Available
11	Trim By Surface/Plane	Animated GUI not available	Available
12	Sweep	Section need not to be on Sketch Path	Section need to be on Sketch Path
13	3 D Curve	Not associative	Associative
14	Bridge curve	Can't be manipulated	Easy to manipulate
15	Helix curve	Equation required	Easy to create (Separate Command available)
16	Hole,Boss,Pocket	Not Available	Readymade Feature Available
17	Pad,Slot,Groove,Dart		
18	Thread (Symbolic/Detailed)		

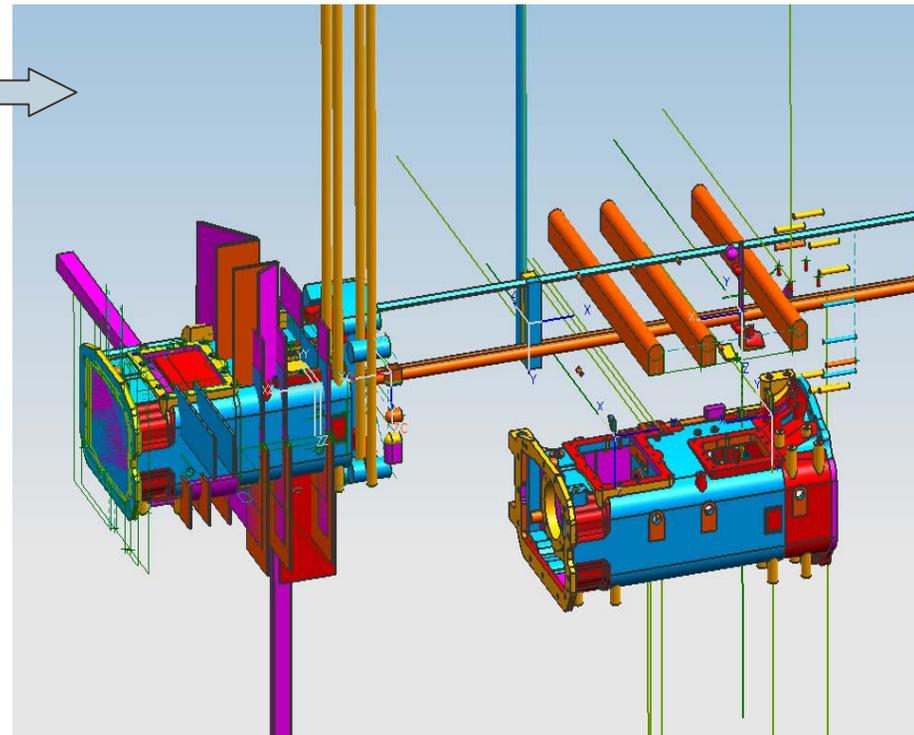
NX Functionality compare with IDEAS-12

	Function	IDEAS-12	UG NX4
19	Blend	Only 1 Fillet is available	4 types of blends
20	Update	Update to be done manually	Automatic update
21	Time stamp Order	Not Available	Available
22	Resizing of Datum's	Not Available	Manual resizing is possible
24	Reflect of features	Not possible	Possible
25	Right click menu commands	Not Available	Available for View, Edit etc.
26	Wave Link Capability	Not Available	Available
27	Feature Dependency	Not possible to see in history	Available in history and separate dependency browser
28	Reattaching of Sketch	Not Available	Available
29	Automatic adjustment of sketch view	Manual	Automatic
30	Moving Dimensions	Difficult	Easy
31	No. of constraint reqd.	Not available	Available
32	List of geometric constraints	Not available	Available

Post Migration: Part Fixing in UG NX4



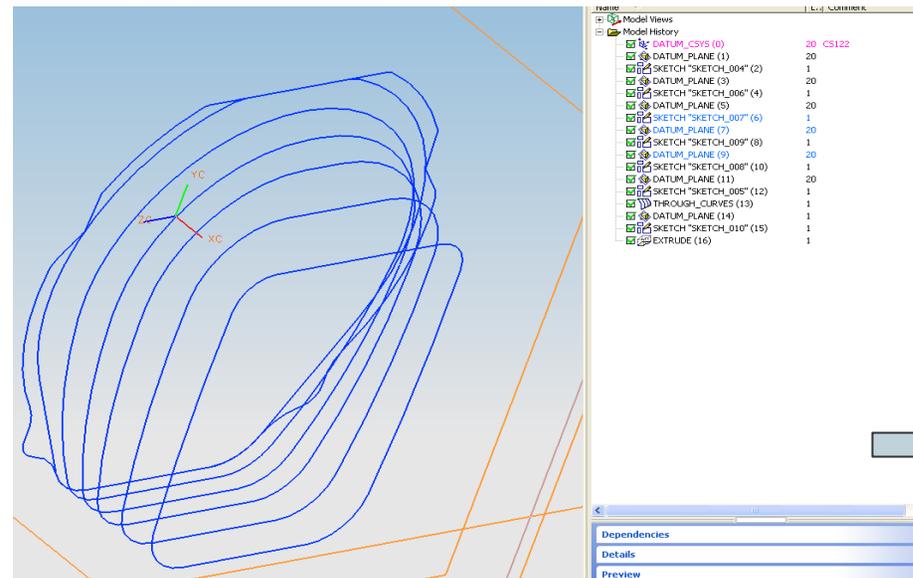
Part in IDEAS-12



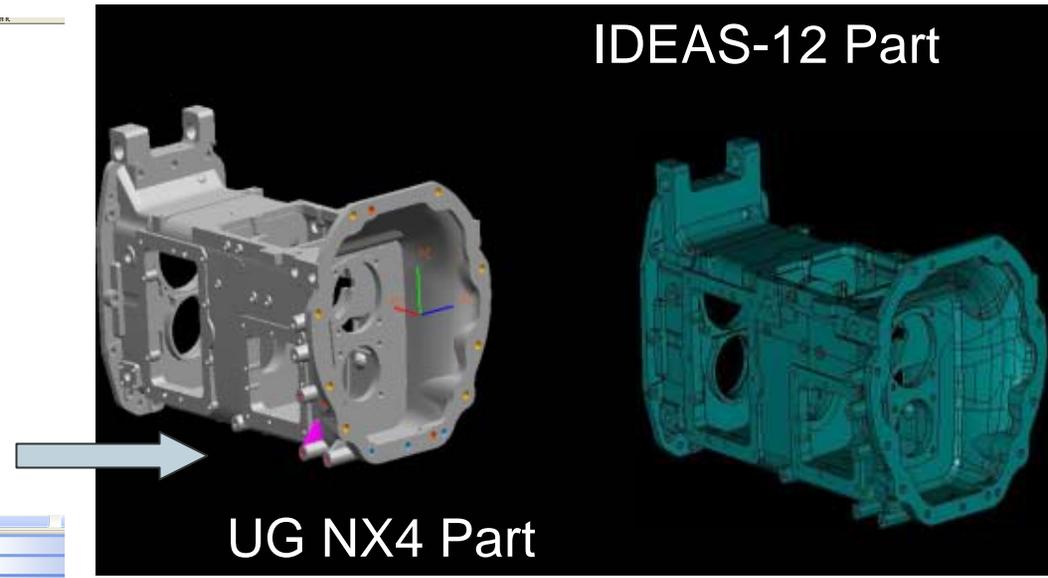
Part in UG NX4 after migration

Transmission Assembly Speed Housing

Post Migration: Part Fixing in UG NX4



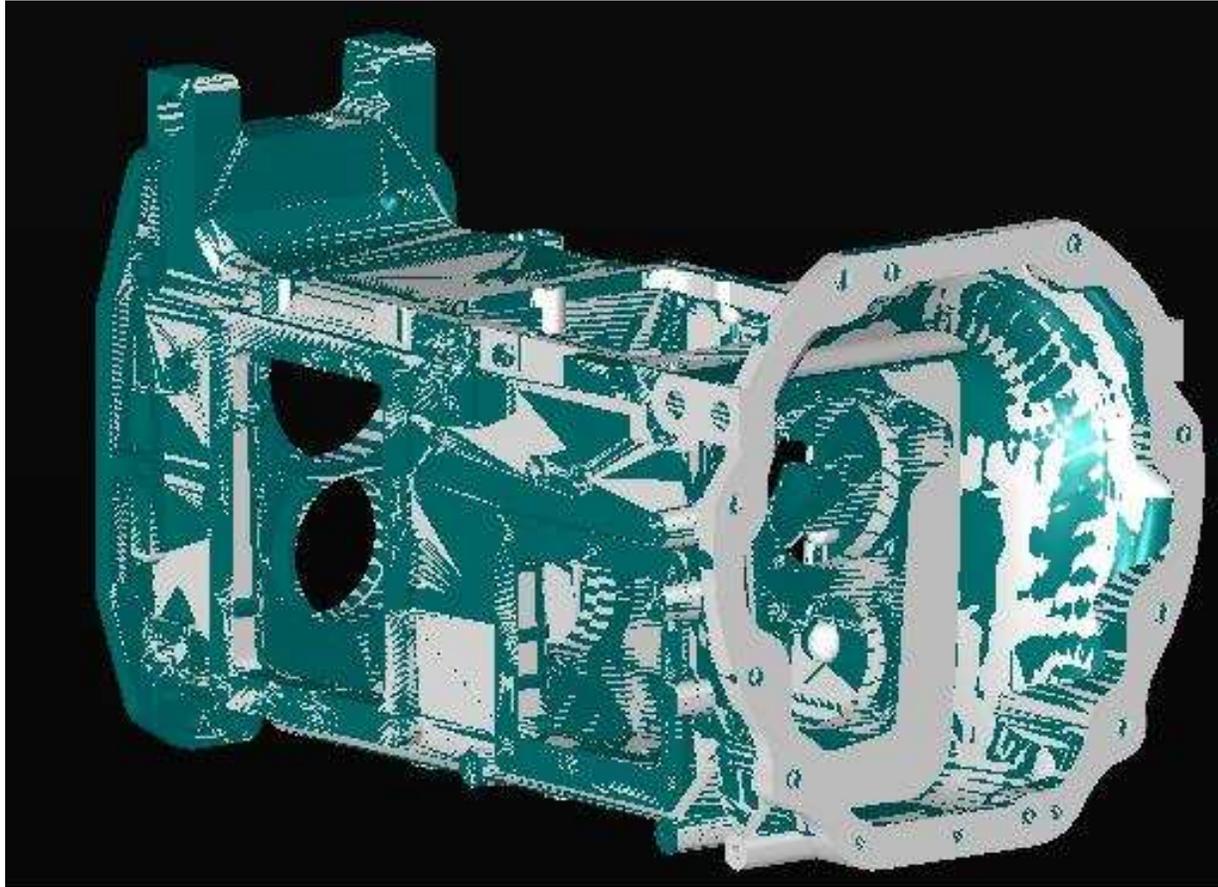
Feature creation using Data Access



Part after fixing errors in UG NX4

Transmission Assembly Speed Housing

Post Migration: Part Fixing in UG NX4



Final data impose - UG NX4 & IDEAS-12 for Cross Verification

Learnings And Best Practices

- **Reflect only feature**

In NX there is no option available to keep one side during reflect operation. To do that user have to hide unwanted side after reflect operation or user have to move unwanted side to different layer and change it to invisible mode.

- **Constraining**

It has been observed that by constraining sketches in IDEAS before migration improves the results by reducing unparameterized and data access features.

- **Coordinate System (CYS)**

It is always a good practice to maintain one base datum coordinate system.

Learnings And Best Practices

- **Exploded features**

To rectify features that are exploded and created at different places after migration the user can move scattered features one by one to their respective position by taking reference of other features which are in correct position.

- **Replace resultant B-rep body**

Before deleting B-rep body always replace that body with feature whether dependencies are there or not

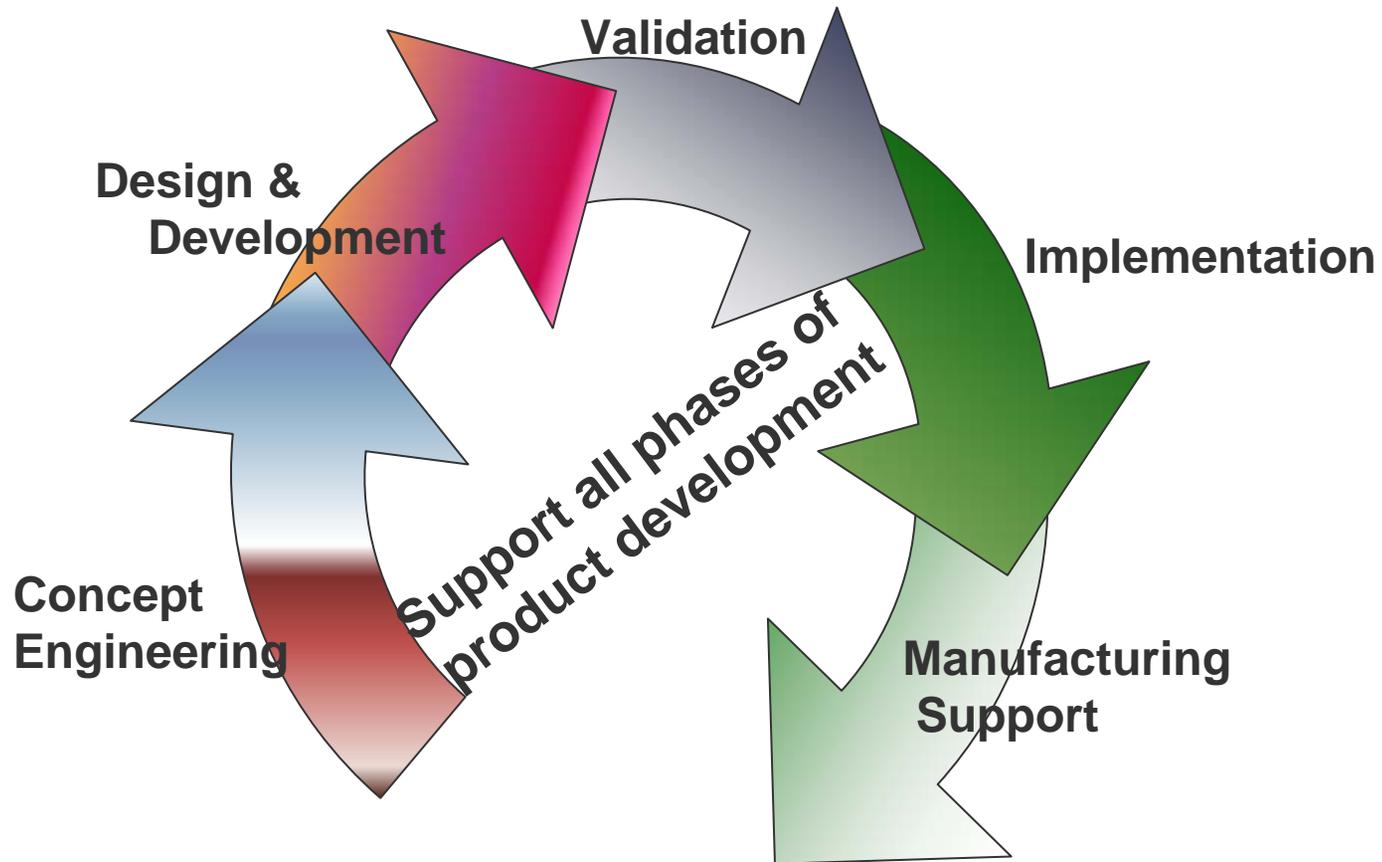
- **Translate features**

To determine location of scattered features, go to ideas and extract those features. Now export those features as IGES and import into NX. They are imported at their original location with respect to B-rep geometry.

Mahindra Engineering - Company Profile

- Mahindra Engineering is a part of well diversified Mahindra & Mahindra group.
- Set up in 1945, Mahindra & Mahindra is ranked among top ten business houses in India.
- The company has a strong presence in diverse sectors like automobiles, tractors, auto components, financial services, infrastructure & hospitality & software.
- It's the largest manufacturer of utility vehicles & tractors in India along with most extensive distribution network.
- Group revenue over USD 2.6 billion & a work force of over 15,000 employees

Mahindra Engineering – Services Offered



Services provided to Automotive, Aerospace as well as General engineering verticals.

Mahindra Engineering – Client base



HONDA



TOYOTA



VOLVO

Volvo Trucks - India



DAIMLERCHRYSLER



Mahindra Engineering – Locations



Contact us

India

Mr. Prashant Kamat

Global Head - Business Development
Mahindra Engineering – INDIA
MISEM Tower, 19/2, Plot No.15,
Off Karve Road, Near Sharda Centre,
Erandwane, Pune-411004, India

Tel: +91-202 540 9102

Dir: +91-202 545 9782

Fax: +91-202 545 9783

Email:

kamat.prashant@mahindra.com

USA

Mr. Viresh Doshi

Vice President, North America
Mahindra Engineering – USA
30700, Telegraph Road, Suite 2620
Bingham Farms, Michigan 48025

Tel: +1-248 594 4001 Ext – 111

Fax: +1-248 594 1959

Mobile: +1-248 444 7247

Email: doshi.viresh@mahindra.com



Thank You

