

Applying the Knowledge Aware Technique within CAD Applications

September 25, 2019

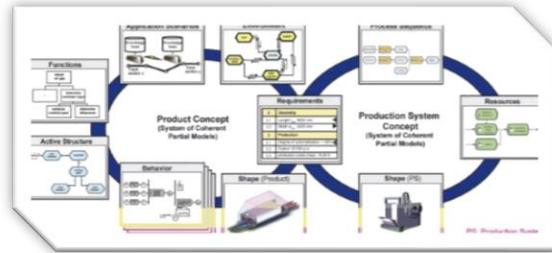
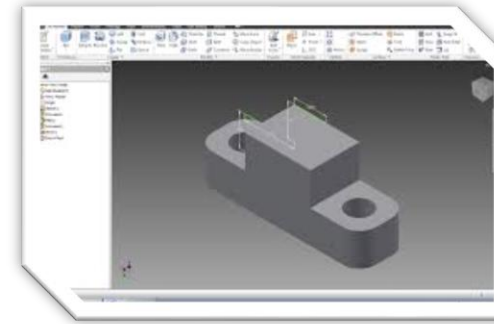




Product Models



Design Models

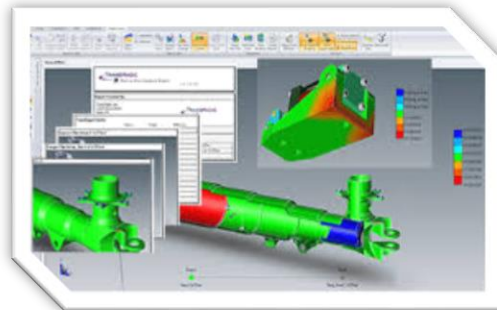


Model Based Engineering



System Models

Manufacturing Models



Validation Models



Operational Models

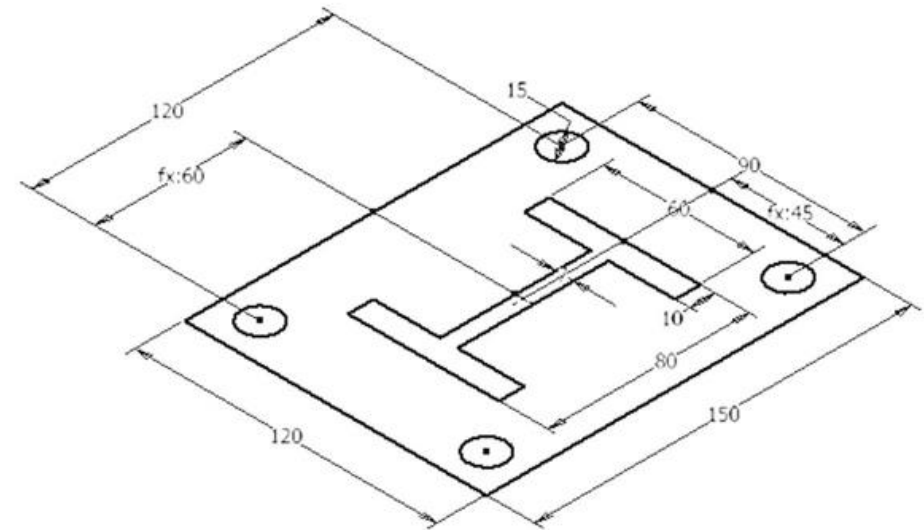
Knowledge Based Engineering (KBE) vs Knowledge Aware

Parameters

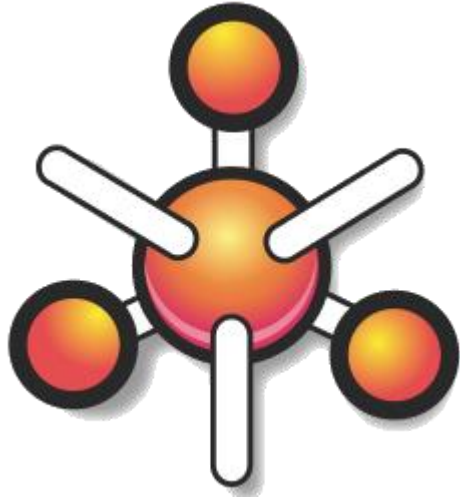
Parameter Name	Unit/T	Equation	Nominal V	Tol.	Model Val	Key	Comment
Model Parameters							
User Parameters							
S:W	mm	800 mm	800,00...	●	800,00...	<input type="checkbox"/>	<input checked="" type="checkbox"/> Width
S:H1	mm	320 mm	320,00...	●	320,00...	<input type="checkbox"/>	<input checked="" type="checkbox"/> Height of deck 1
S:H2	mm	700 mm	700,00...	●	700,00...	<input type="checkbox"/>	<input checked="" type="checkbox"/> Height of deck 2
S:Base	mm	12 mm	12,000...	●	12,000...	<input type="checkbox"/>	<input checked="" type="checkbox"/> Height of base Plate
S:IF1	True...	True				<input checked="" type="checkbox"/>	Deck1 yes/no

$E = mc^2$ $P + \rho \times \frac{1}{2} v^2 = C$ $E = mc^2$ $P + \rho \times \frac{1}{2} v^2 = C$ $E = m$
 $\nabla \times E = -\frac{\partial B}{\partial t}$ $\nabla \times E = -\frac{\partial B}{\partial t}$ $\nabla \times E = -\frac{\partial B}{\partial t}$
 $F = G \times M \times n \div d^2$ $\Delta S_{universe} > 0$ $F = G \times M \times n \div d^2$ $\Delta S_{universe} > 0$ F
 ∂B ∂B

Filter Add Numeric Update Purge Unused Reset Tolerance << Less Done
Link Immediate Update + ▲ ● -



Fundamental Enabling Technologies



Knowledge
Packet



Rule Processing
Engine



Assessment
Control



K-PAC Detail View - Google Chrome

Not secure | nt2.aurosks.com/auros/kpac/view/DEMO-2#details

DEMO-2 Desired Engagement of console locator Pins to Hinge Product Design Standard

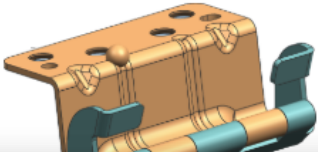
Details Relations Teams Discussions

v2

Description

Desired Engagement of console locator Pins to Hinge. Minimum and Maximum engagement length of locator. The location feature must be at least 45% of the part thickness but no more than 60% of the part thickness. Design the locating feature to make contact with the mating component with the prescribed minimum engagement (plus chamfer) before any other contact during sub-assembly.

Additional Information



BASIC PRINCIPLES OF LOCATING
To perform properly, workholders must accurately and consistently position the workpiece relative to the cutting tool, part after part. To accomplish this, the locators must ensure that the workpiece is properly referenced and the process is repeatable.

Value Table -

Min Locator Pin Engagement	Max Locator Pin Engagement
0.45*part_thk	0.6*part_thk
Minimum mm	Maximum mm
loc_pin_engage	loc_pin_engage

Justification	K-PAC Type	Product Design Standard	Author	Boisvert, Steve(sboisve1)
	K-PAC Status	Active	Contact	
Current Version Published Date			E2ks Core Template	Basic

Number of Results: 49 [Servlet/ReturnBlobImage?fileNam...](#)

Auros: Core Technology



Assessment Control

AC-3730 Mercury Product Design
FRBULTR - Farbulator Engineering
Product Design Review

AC View
Assessment Header
LineItem Sheet
Parameter View

Conformance State Filter

- 5
- 13
- 3
- 6

Legend: NE (White), Pass (Green), Fail (Red), Pending (Yellow)

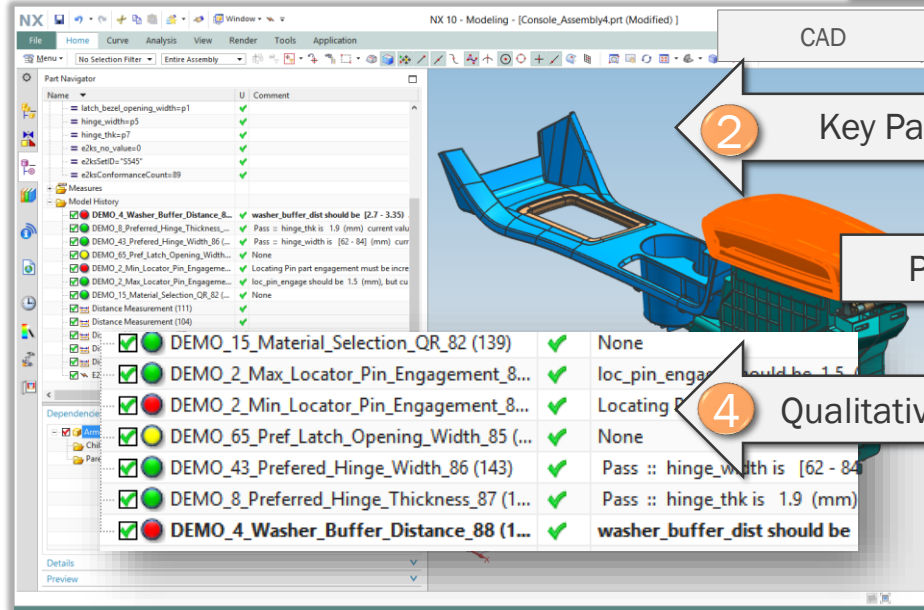
nt2.aurosks.com/auros/jsp/CLParameterGrid.jsp?idx=7258&type=relock
DEMO AC-7258 DN101 Center Console
Power Systems Assessment Control
Evaluation Ready

Parameter View
Descriptor: Assembly A Service Requirements

Parameter List	K-PAC	Reported Value	Computed Values	Computed Parameter Segmentation					Last Modified On
				Minimum	Nominal	Maximum	Units	Precision	
hinge thk		2	1.9	1.9				12-Feb-2019 12:24:39	
hinge width		63	[62 - 84]	62.0		84.0		12-Feb-2019 12:24:48	
washer buffer dist		2.5	[2.7 - 3.35]	2.7		3.35		12-Feb-2019 12:24:28	
loc pin engage		5.12		4.5		6.0		12-Feb-2019 12:25:14	
latch bezel opening width		38		32.0		100.0		12-Feb-2019 12:24:10	

Auros Knowledge Driven Model Based Process

Modeling Tool (Context)



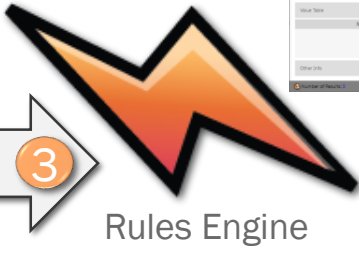
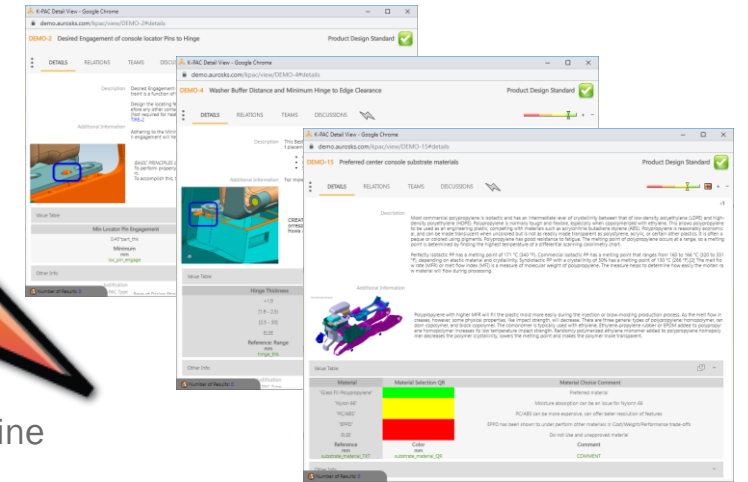
Context Information 1

Key Parameters 2

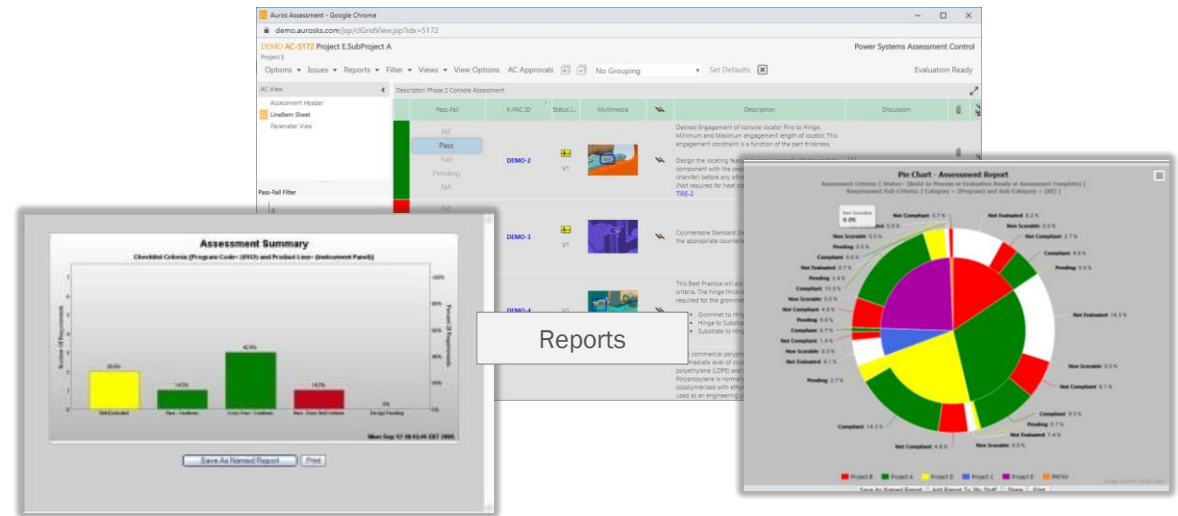
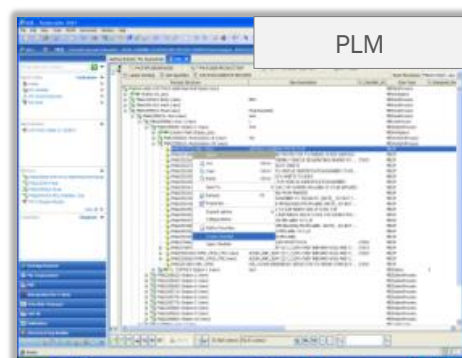
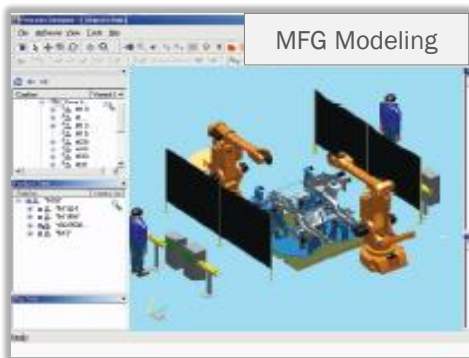
Published Values 3

Qualitative Responses 4

Auros



Rules Engine



Parameter Report

HUBDEMO AC-4280 Project C.SubProject A
Project C

Options ▾ Issues ▾ Reports ▾ Filter ▾ Views ▾ View Options AC Approvals [+] [-] No Gro

Descriptor: demo hub

Conformance State	K-PAC ID	Status L...	Multimedia	Description
NE	HUBDEMO-3	V1	[Image]	mounted in the same
Red				
Yellow				
Green				
NA				
NE	HUBDEMO-4	V1	[Image]	
Red				
Yellow				
Green				
NA				
NE	HUBDEMO-5	V1	[Image]	
Red				
Yellow				
Green				
NA				
NE	HUBDEMO-6	V1	[Image]	Trunnion Length
Red				
Yellow				
Green				
NA				

Auros Rule Processing Engine (RPE)

Parameters

- bolt_circle_diameter
- bolt_hole_size
- flange_od
- flange_od_calc

Evaluations

Rule Name	Eva
Flange OD Calculated	
Flange OD Min	
Flange OD Max	



Auros CAD Connector Strategies

Non-Parametric Model Validation

Free Form CAD

Template – Smart Part CAD

Automated Drawing / Model Validation with Proxy Parameters

- Dynamic delivery of key parameters and rules
- Real-time conformance reporting
- Imbedded knowledge references
- Closed loop learning
- Auto connect to Existing Parameter and Relations
- Introduce new / modified rules on the fly
- Real-time Web Conformance Reporting - Feedback





Non-Parametric Model Validation



Template – Smart Part CAD

NX



Automated Drawing / Model Validation with Proxy Parameters



Knowledge Based Engineering (KBE) not the same as Knowledge Aware

Applicability of Knowledge Aware across Workflows

- Non-Parametric Model Validations
- Freeform CAD – (Not Shown)
- SMART Templates
- Automated Validations with Proxy Parameters

Benefits of Applying Knowledge Aware within CAD Applications

- Certainty on Knowledge Reuse
- Continuous Product Validation
- Closed Loop Enterprise Learning

Live Demonstrations Available



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Knowledge Best Shared