



CCAD Technical Training Initiatives

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Problem

- Over 50% of federal workforce retirement eligible
- New technology and change become difficult to implement due to loss of corporate knowledge
- High workload, continuous maintenance operations
- Limited formal training available
 - Production must continue
 - Cannot afford lengthy training sessions
 - Knowledge is highly specialized
 - Typically only have OJT to pass on knowledge



Solution

Utilize New/Emerging Training Technologies

- CBT Training
 - Self-paced PC study modules
 - Utilize a combination of mixed media formats; video, animation, and graphics
 - Lesson modules include student assessment and recordkeeping
- Modeling and Simulation
 - Learn by doing
 - Keeps learner interest and excitement
 - Second nature to younger generation employees



Computer Based Training

- Developed for Metal Finishing Artisans (currently trained via OJT)
- Three unique CBT courses + one simulation
 - Hard Chrome Basics (6 modules, 80 lessons)
 - Current Density Calculator
 - Electroplater Troubleshooting Guide
 - Electroplating Bath Simulator
- 18 month CTMA funded project



Participants



- NCMS Educational Services
- DoD Depots
 - Corpus Christi Army Depot (CCAD)
 - Tinker AFB
 - Fleet Readiness Center (East & Southwest)
- Industry content experts



Target Audience

- DoD maintenance activity metal finishers
 - Platers, technicians, and QC
 - Front line supervision and support staff (laboratory)
- Commercial project partners (e.g., Boeing Suppliers)





Benefits

- Structured and understandable training
- Complements OJT efforts
- Impromptu training during non-production periods
- Minimal impact to regular production
- Regain the depth of knowledge that is currently being lost (rebuild it better than before)
- Decreased cycle time and improved process quality



Plater Feedback

“From what I saw, they hit this right on the head and they're on the right track.”

Reuben Trevino, Chrome Work Leader

“At last!! After 20 years of attempting to put together some type of formal training, you all have covered all aspects of basic chrome plating. I believe this training can only make our CCAD chrome platers ready for any type certifications, or work load requirements for the future. Hats off to all involved.”

Ralph Boughton, Electroplater Quality Control Inspector

“I really enjoyed the course! The graphics and animations kept my attention throughout the presentation. The main topics of hard chrome plating are introduced simply for a general understanding.”

Amanda Miller, Chemist



Current Status

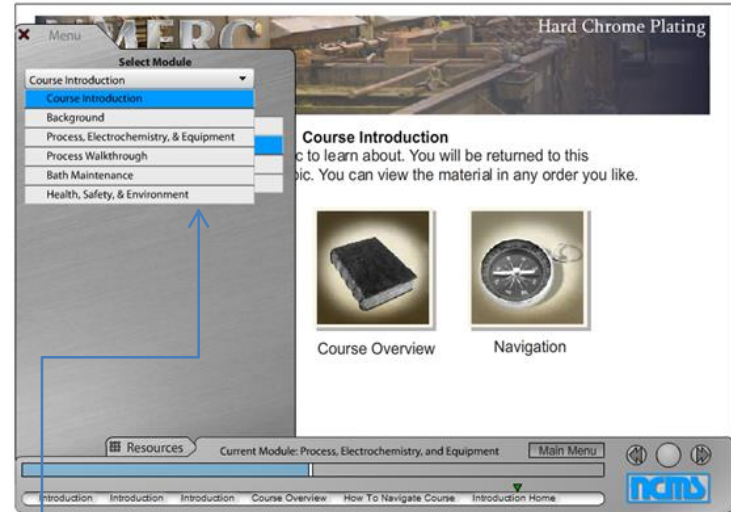
- The course and supplemental modules uploaded to Army e-Learning
- Working on “Pathways” program to bring in a very limited number of new hires
- Utilization of the training module will be formal part of their training
- The training module will be used in conjunction with a new training initiative for the Pathways candidates



CBT CCAD Courses



Entry page into course



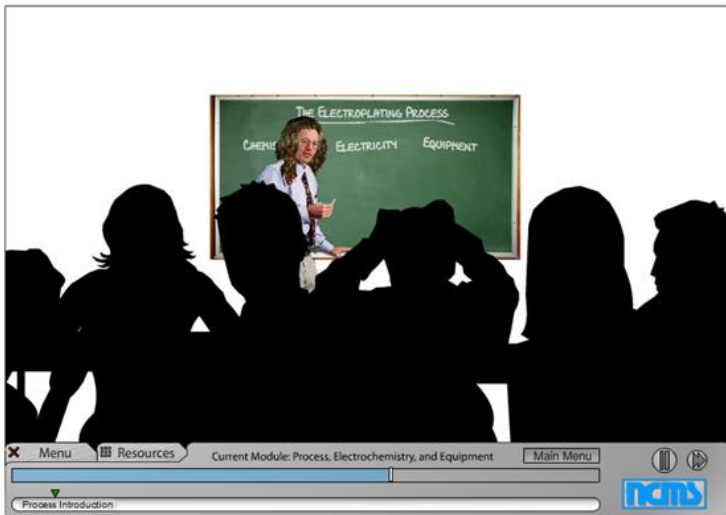
Drop down course module menu



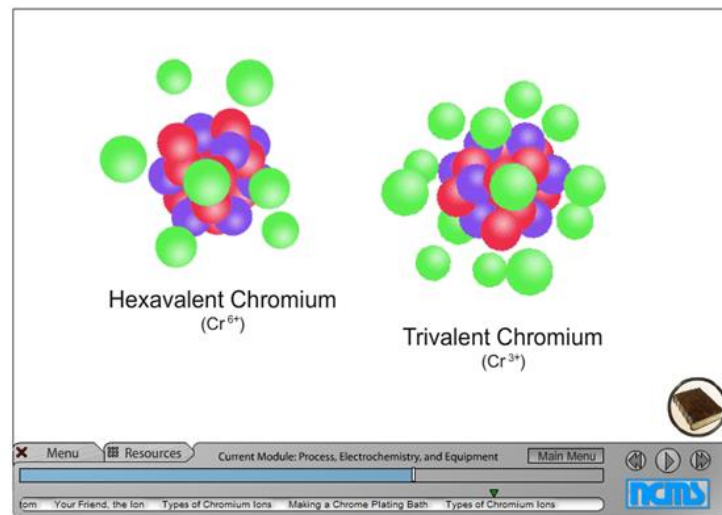
Clickable icons (in Course Introduction Module)



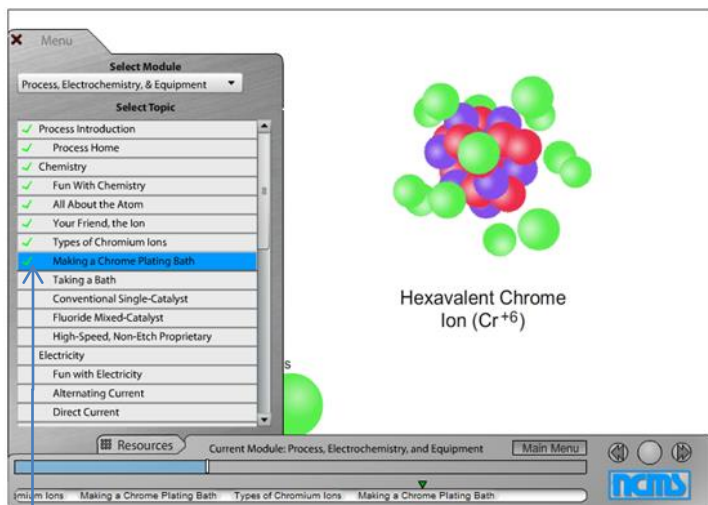
Clickable icons (in Process, Chemistry & Equipment Module)



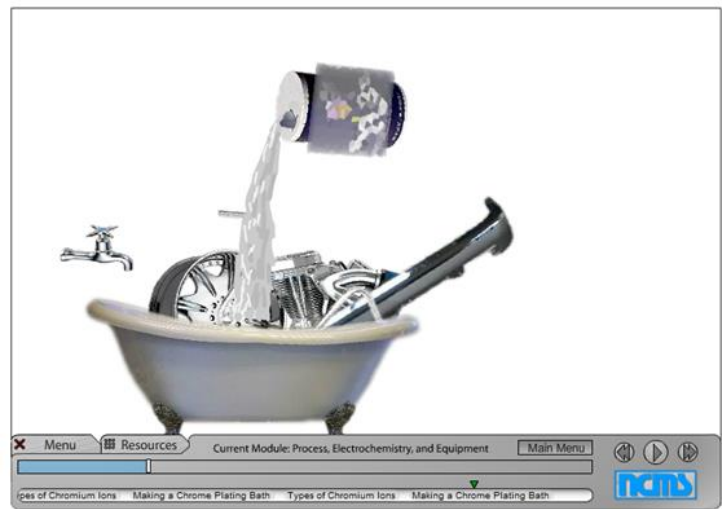
Process, Chemistry & Equipment Module “Introduction”



“Types of Chromium Ions” animated scene



Drop down menu showing completed topics



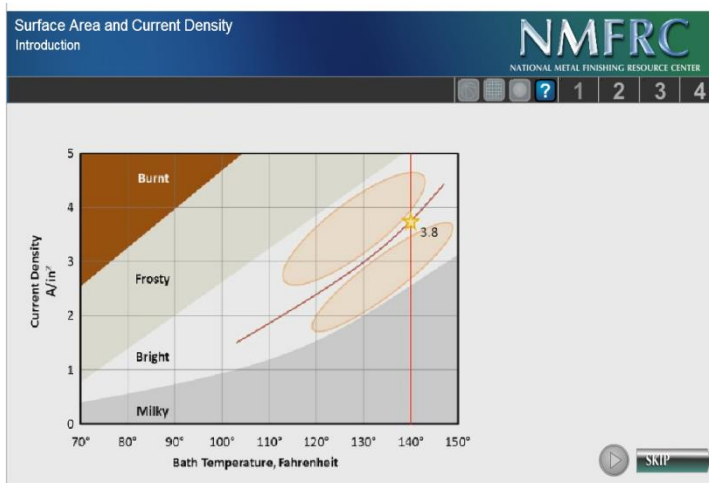
Next animated scene “Taking a Bath”



Entry page into Current Density Calculator Course



Calculator Introduction – narrated and animated




Calculator Introduction – second sample screen cap



Stage 1: Primitives entry page

Surface Area and Current Density
Stage 1 Primitives
Directions: Click to proceed through stage

Next: 

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◀ Last Next ▶ ? 1 2 3 4

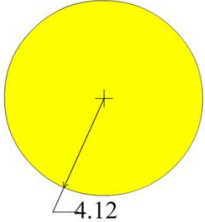
Circles are a little tougher.

So, surface area of a circle equals...

Surface area = $\pi(r^2)$

Groups in parentheses should be calculated first. So we'll start with r^2 .


$4.12 \cdot 4.12$
 $r^2 = 16.97$



[Click here](#)

Stage 1: Circle Area Calculation (click through steps)

Surface Area and Current Density
Stage 1 Primitives
Directions: Click to proceed through stage

Next: 

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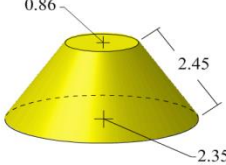
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Now we're going to try a really tricky one.

This sliced-off cone looking thing is called a frustum.

Surface area = $\pi(R + r)s + \pi r^2 + \pi R^2$


$\pi(3.21)s + \pi(0.73) + \pi(5.52)$
 $24.69 + 2.29 + 17.33$



[Click here](#)

Stage 1: More Complicated Calculation (click through)

Surface Area and Current Density
Stage 2. Combined Primitives
Directions: Drag and drop to solve

Next: 


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Drag the correct formula for the individual primitives to the boxes below.

Stage 2: Combined Primitives

In this stage, you'll apply what you just learned about primitives and surface area calculations. It gets more challenging now, because you need to take into account surfaces that aren't to be plated.




[Begin](#)

Surface Area =

Stage 2: Combined Primitives entry page

Surface Area and Current Density
Stage 2. Combined Primitives
Directions: Drag and drop to solve

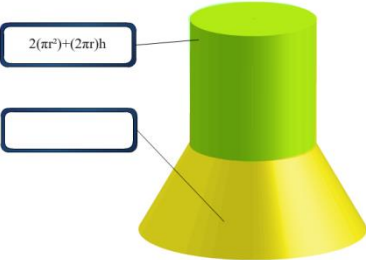
Next: 

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◀ Last Next ▶ ? 1 2 3 4

Drag the correct formula for the individual primitives to the boxes below.

$\pi(R+r)s + \pi r^2 + \pi R^2$ $2(\pi r^2) + (2\pi r)h$ πr^2 $\pi(r^2) + (\pi r s)$



Surface Area = $(2(\pi r^2) + (2\pi r)h) +$

Formulas for Finding Surface Area

- Plane: $l \times w$
- Circle: πr^2
- Cylinder: $2(\pi r^2) + 2(\pi r)h$
- Cube: $6(lh)$
- Prism: $2(lh) + 2(w) + 2(lw)$
- Cone: $\pi(r^2) + (\pi r)s$
- $\pi r^2 + \pi r \sqrt{r^2 + h^2}$
- Frustum: $\pi(R+r)s + \pi r^2 + \pi R^2$
- $\pi(R+r)\sqrt{(R-r)^2 + h^2}$
- Torus: $4r^2R = (2\pi r)(2\pi R)$

Correct Amperage = $3.8 \times$ Area to be Plated
Current Density = Amperage/Area to be Plated

Note: formula bar expanded for easy reference

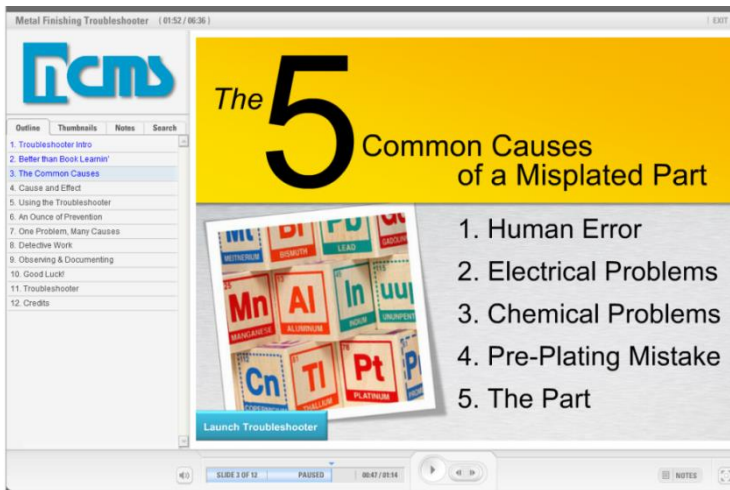
Stage 2: Combined Primitives sample (drag and drop formulas)



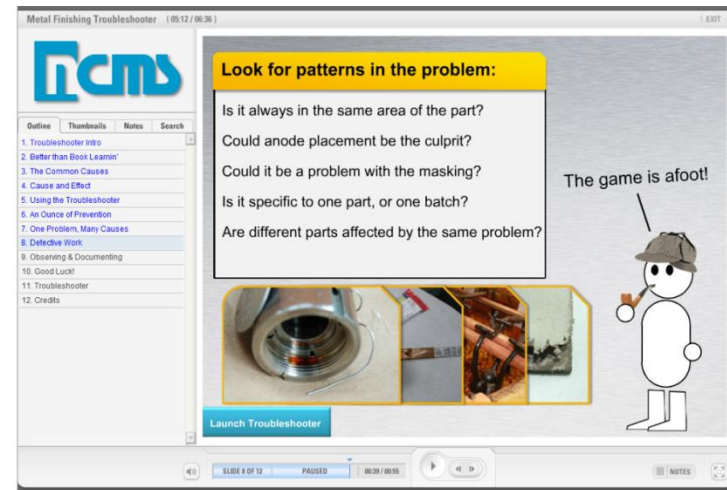
Entry page into the Troubleshooting Guide Introduction



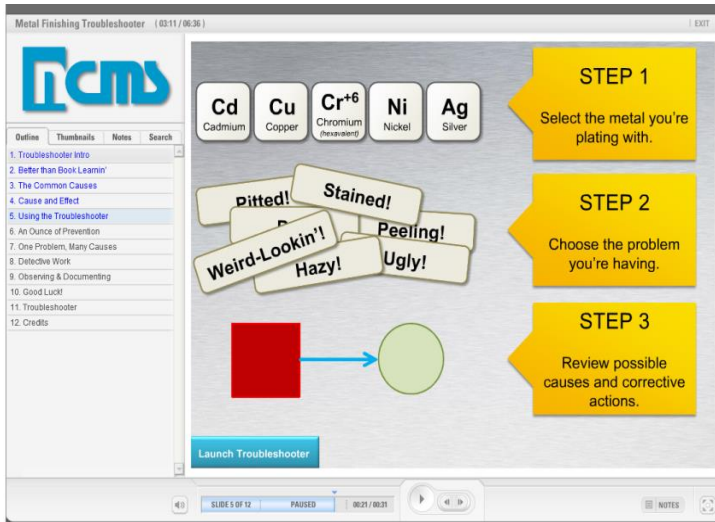
Drop down menu to Introduction topics



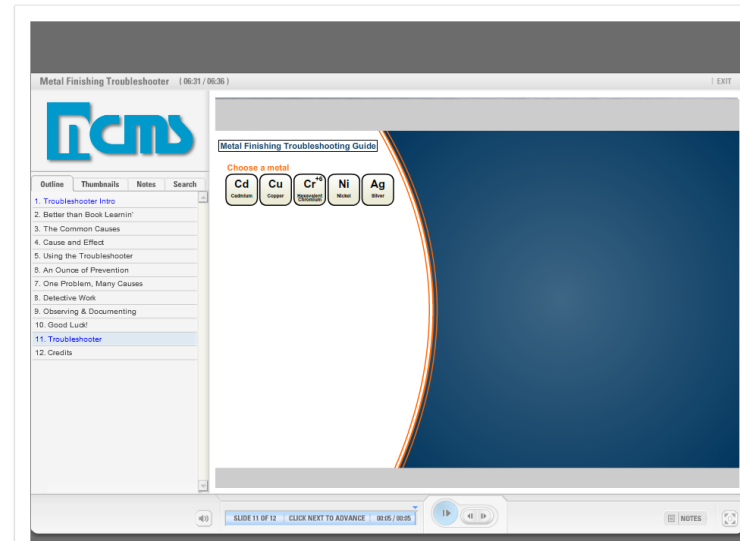
Sample screen cap of Introduction (fully narrated)



Another sample screen cap of Introduction (with animated builds)



Last Introduction screen cap on "How to Use" Guide



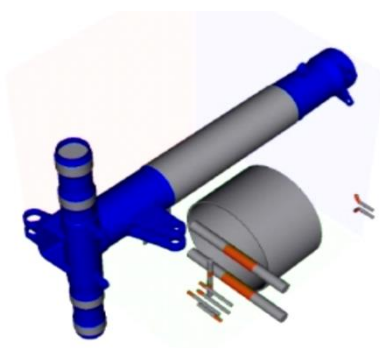
Entry page of Troubleshooting Guide



Sample screen cap of typical Chromium plating issue



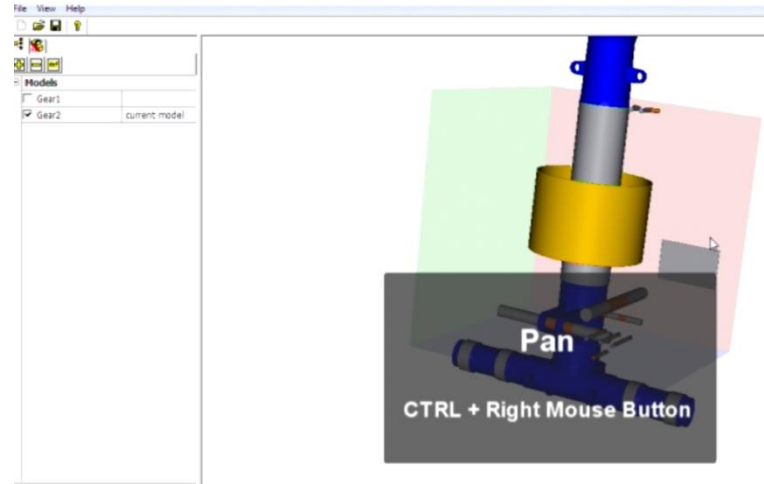
Sample screen cap of typical Cadmium plating issue



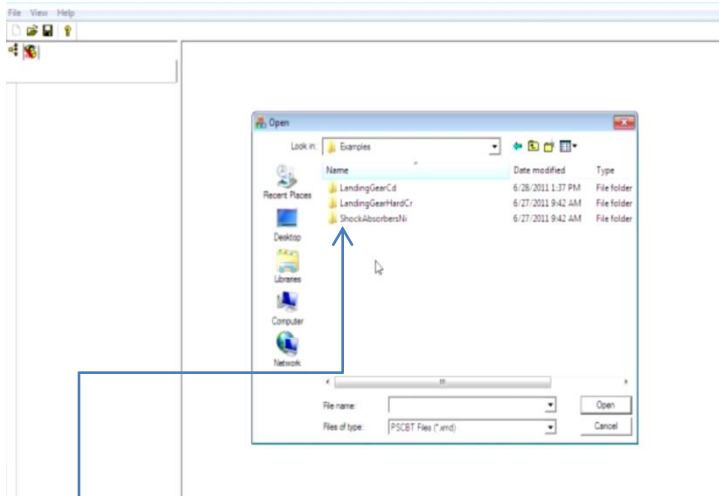
Plating Shop Computer Based Training Software



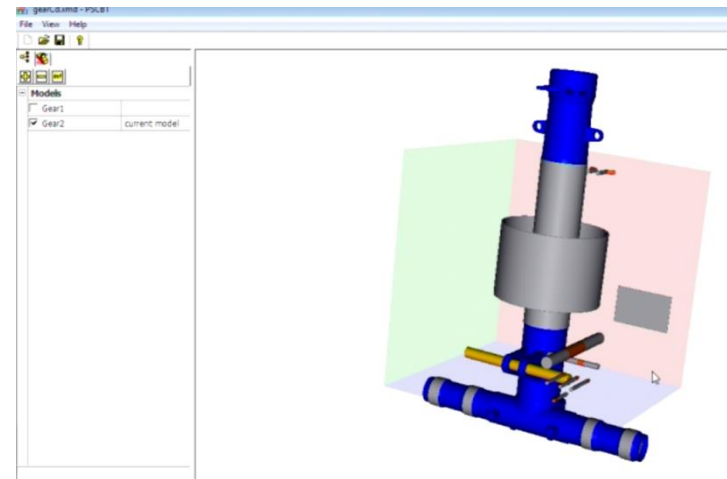
Entry page into Simulator Tutorial



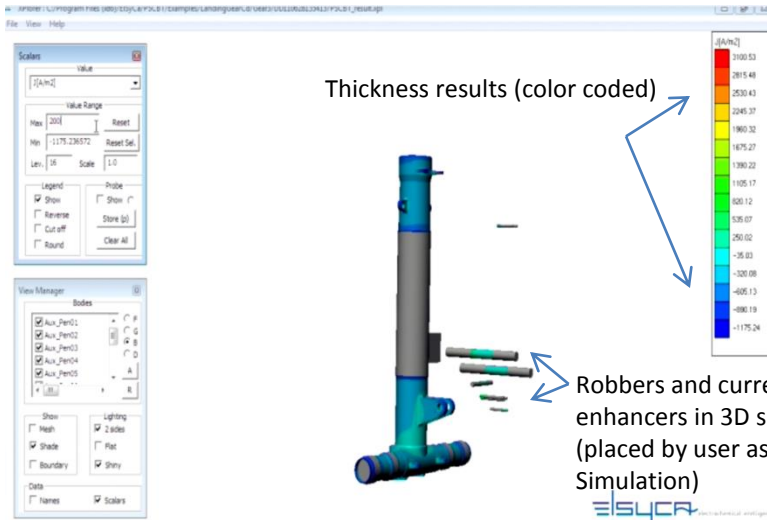
Sample screen cap from Tutorial (produced in Captivate)



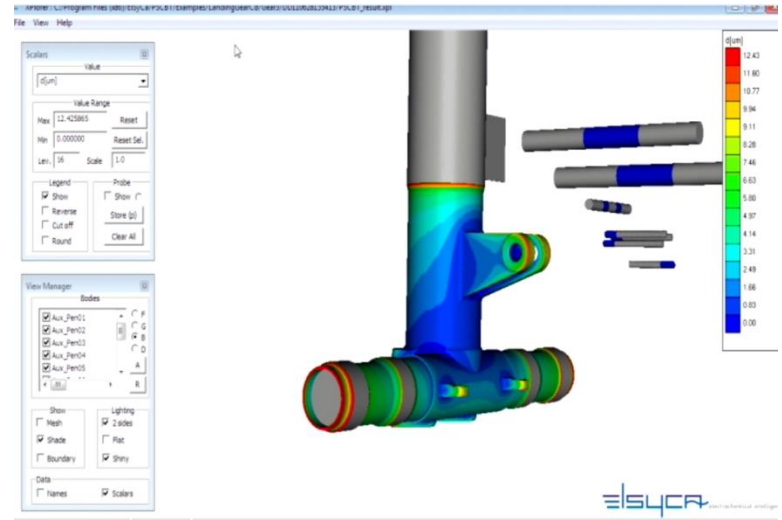
Drop down menu of parts available in Simulator



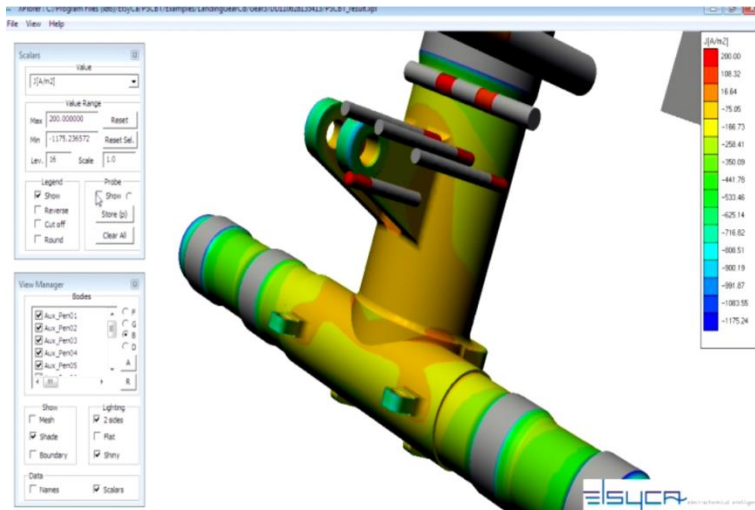
Entry screen into Simulator once part is chosen



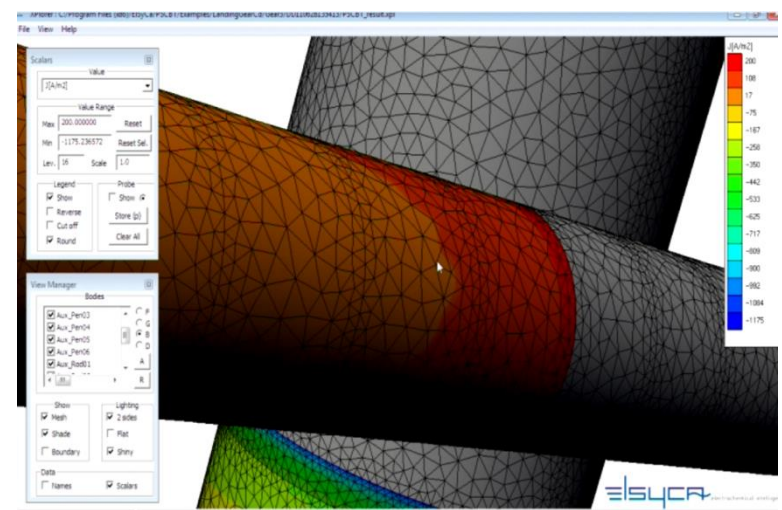
Screen cap of Simulator results



Close up of Simulator results (color coded by thickness)



Part rotated (color coded, current density results shown)



Extreme close up of part in wire mesh form