UGS CONNECTION

AMERICAS 2008

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All Aboard the Expression Express

Presented by :

Travis Bennett
& Dan Rumple

Employer:
DePuy Orthopaedics
a Johnson & Johnson company

Presentation Overview

- Overview
  - Introductions
  - Basic Expressions
  - Suppress by Expression
  - Expressions in Drafting
  - Geometric Expressions
  - Interpart Expressions
  - Conditional Expressions

Travis Bennett
Senior Product Designer

- 8 yrs Orthopedic design experience
- Multiple UGS courses
- Certified Design Professional ~ One of the Elite 100!
- Associates degree in Tool Engineering Technology from ITT Technical Institute (Ft Wayne, IN)

Dan Rumple
Senior Product Designer

- 11 yrs Orthopedic design experience 21 yrs total design experience
- Multiple UGS courses
- Certified Design Professional ~ One of the Elite 100!
- Associates degree in Tool Engineering Technology from ITT Technical Institute (Ft Wayne, IN)

DePuy Orthopaedics

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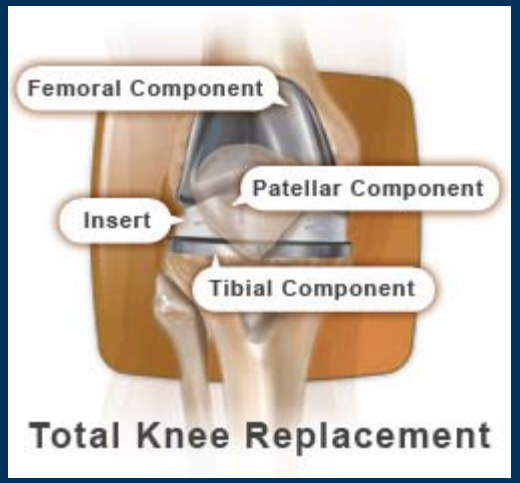
DePuy
a Johnson & Johnson company
RESTORING THE JOY OF MOTION™

- Founded in1895, World's first orthopedic company
- Global presence



KneeReplacement.com

The Basic Expression

Ant_rad (PROFILE:Sketch(1) Radius Dimension on Arc6)	36	36	mm	Number
AP (PROFILE:Sketch(1) Perpendicular Dimension between Line5 and Arc6)	42.5	42.5	mm	Number
C_rad (ART_SURFACE:Sketch(4) Radius Dimension on Arc14)	20	20	mm	Number
ML (PROFILE:Sketch(1) Perpendicular Dimension between Line8 and Line9)	63.9	63.9	mm	Number
Notch_depth (PROFILE:Sketch(1) Perpendicular Dimension between Line5 and Arc7)	12	12	mm	Number

Ant_rad (PROFILE:Sketch(1) Radius Dimension on Arc6)	36	36	mm	Number
AP (PROFILE:Sketch(1) Perpendicular Dimension between Line5 and Arc6)	42.5	42.5	mm	Number
C_rad (ART_SURFACE:Sketch(4) Radius Dimension on Arc14)	20	20	mm	Number
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Notch_depth (PROFILE:Sketch(1) Perpendicular Dimension between Line5 and Arc7)	12	12	mm	Number
Notch_rad (PROFILE:Sketch(1) Radius Dimension on Arc7)	13	13	mm	Number
p4 (PROFILE:Sketch(1) Radius Dimension on Arc9)	11.1049090426	11.1049...	mm	Number
p5 (PROFILE:Sketch(1) Radius Dimension on Arc10)	15	15	mm	Number
p9 (Extrude(2) Start Limit)	0	0	mm	Number
p10 (Extrude(2) End Limit)	Thickness+10	20	mm	Number
p14 (Datum Plane(3) Offset)	AP*.5	21.25	mm	Number
p17 (ART_SURFACE:Sketch(4) Radius Dimension on Arc12)	20	20	mm	Number
p20 (ART_SURFACE:Sketch(4) Horizontal Dimension between Line11 and Line11)	2*C_rad	40	mm	Number
p21 (ART_SURFACE:Sketch(4) Perpendicular Dimension between Line10 and Line13)	30	30	mm	Number
p22 (ART_SURFACE:Sketch(4) Perpendicular Dimension between Line12 and Line14)	ML+5	68.9	mm	Number
p23 (Extrude(12) Start Limit)	-50	-50	mm	Number
p24 (Extrude(12) End Limit)	50	50	mm	Number
p32 (Edge Blend(16) Radius 1)	5	5	mm	Number
p35 (CORONAL_SECTION:Sketch(11) Perpendicular Dimension between Line18 and Line21)	10	10	mm	Number

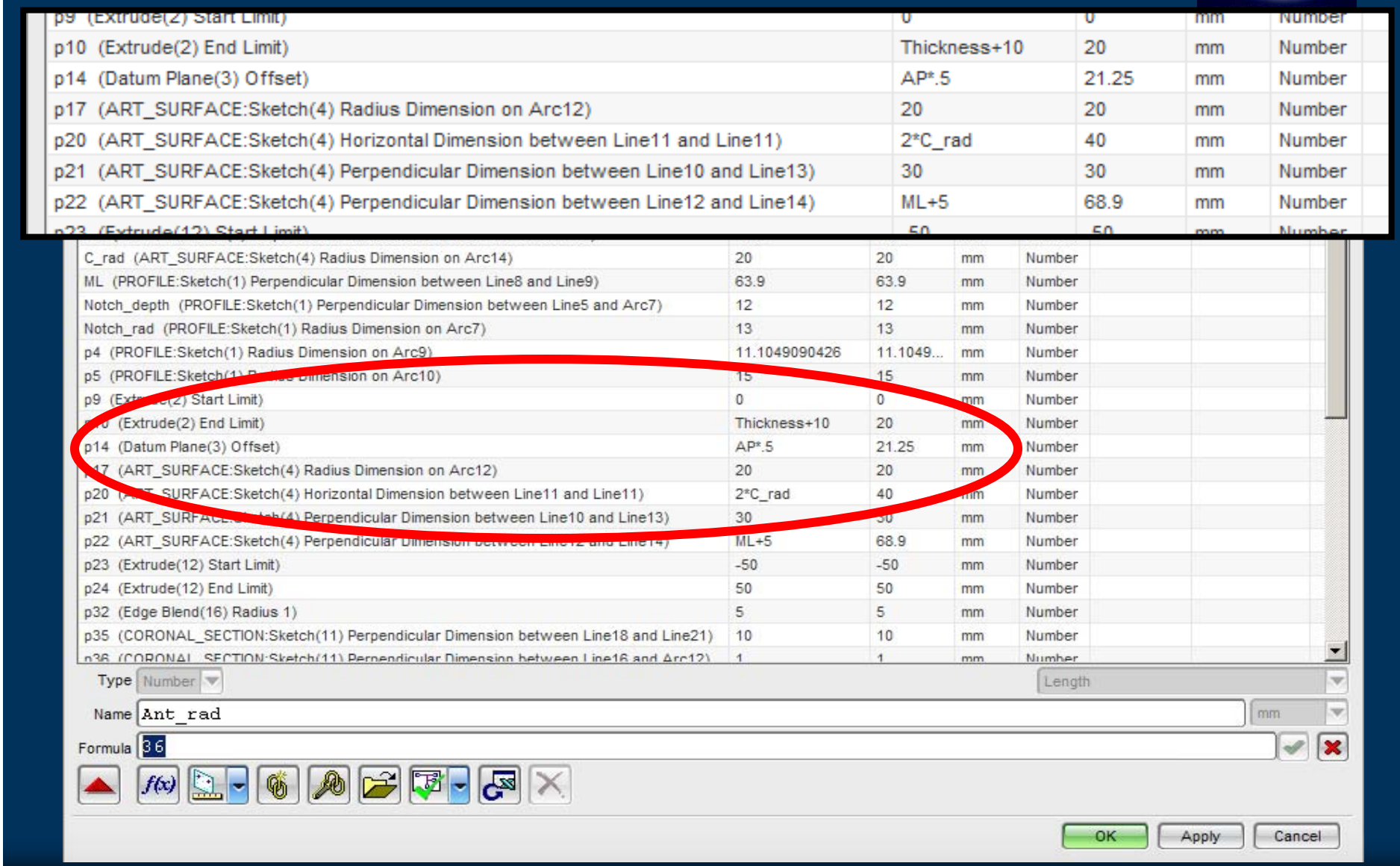
Type

Name

Formula

p5 (PROFILE:Sketch(1) Radius Dimension on Arc10)	15	15	mm	Number
p9 (Extrude(2) Start Limit)	0	0	mm	Number
p10 (Extrude(2) End Limit)	Thickness+10	20	mm	Number
p14 (Datum Plane(3) Offset)	AP*.5	21.25	mm	Number
p17 (ART_SURFACE:Sketch(4) Radius Dimension on Arc12)	20	20	mm	Number
p20 (ART_SURFACE:Sketch(4) Horizontal Dimension between Line11 and Line11)	2*C_rad	40	mm	Number

Simple Equations



p9 (Extrude(2) Start Limit)	0	0	mm	Number
p10 (Extrude(2) End Limit)	Thickness+10	20	mm	Number
p14 (Datum Plane(3) Offset)	AP*.5	21.25	mm	Number
p17 (ART_SURFACE:Sketch(4) Radius Dimension on Arc12)	20	20	mm	Number
p20 (ART_SURFACE:Sketch(4) Horizontal Dimension between Line11 and Line11)	2*C_rad	40	mm	Number
p21 (ART_SURFACE:Sketch(4) Perpendicular Dimension between Line10 and Line13)	30	30	mm	Number
p22 (ART_SURFACE:Sketch(4) Perpendicular Dimension between Line12 and Line14)	ML+5	68.9	mm	Number
p23 (Extrude(12) Start Limit)	-50	-50	mm	Number

C_rad (ART_SURFACE:Sketch(4) Radius Dimension on Arc14)	20	20	mm	Number
ML (PROFILE:Sketch(1) Perpendicular Dimension between Line8 and Line9)	63.9	63.9	mm	Number
Notch_depth (PROFILE:Sketch(1) Perpendicular Dimension between Line5 and Arc7)	12	12	mm	Number
Notch_rad (PROFILE:Sketch(1) Radius Dimension on Arc7)	13	13	mm	Number
p4 (PROFILE:Sketch(1) Radius Dimension on Arc9)	11.1049090426	11.1049...	mm	Number
p5 (PROFILE:Sketch(1) Radius Dimension on Arc10)	15	15	mm	Number
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p17 (ART_SURFACE:Sketch(4) Radius Dimension on Arc12)	20	20	mm	Number
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p23 (Extrude(12) Start Limit)	-50	-50	mm	Number
p24 (Extrude(12) End Limit)	50	50	mm	Number
p32 (Edge Blend(16) Radius 1)	5	5	mm	Number
p35 (CORONAL_SECTION:Sketch(11) Perpendicular Dimension between Line18 and Line21)	10	10	mm	Number
p36 (CORONAL_SECTION:Sketch(11) Perpendicular Dimension between Line16 and Arc12)	1	1	mm	Number

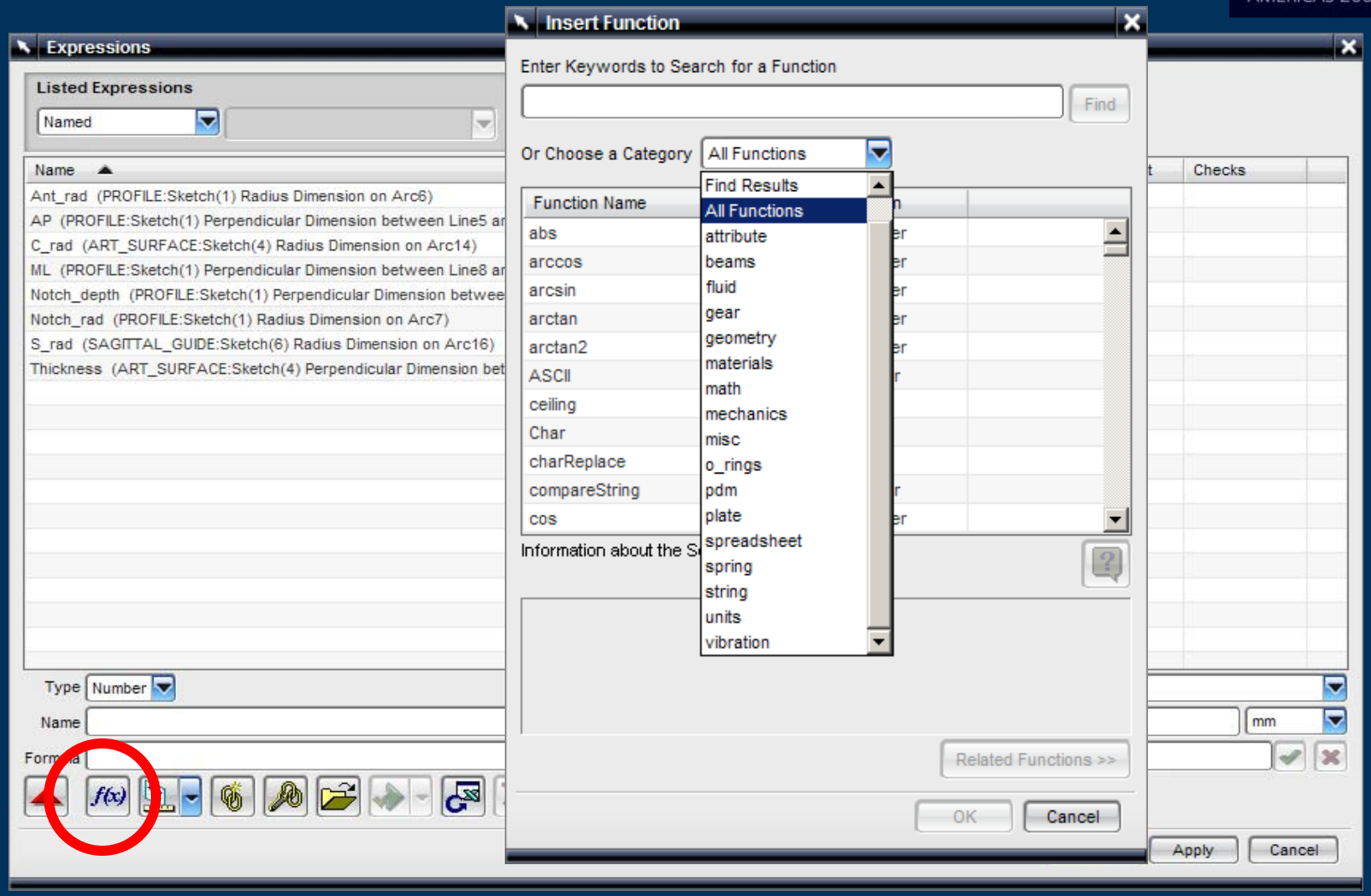
Type: Number — Length

Name: Ant_rad — mm

Formula: 36

OK Apply Cancel

Functions for Equations



Pre NX 5 Expression Editors Modifiers List - Pre NX 5

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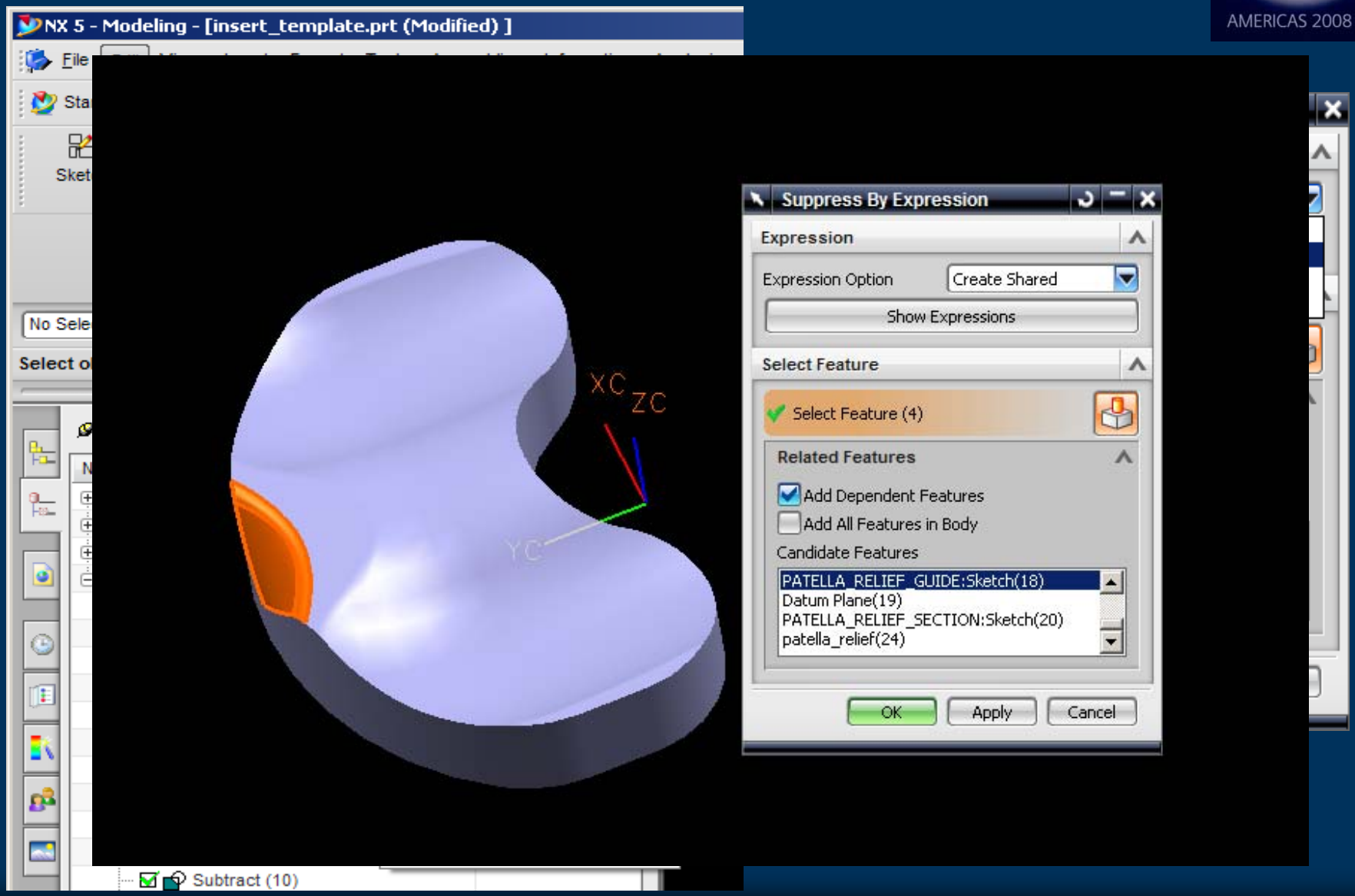
UG Help
- Documentation

Help Library
- Click Magnifying Glass (Global Search)

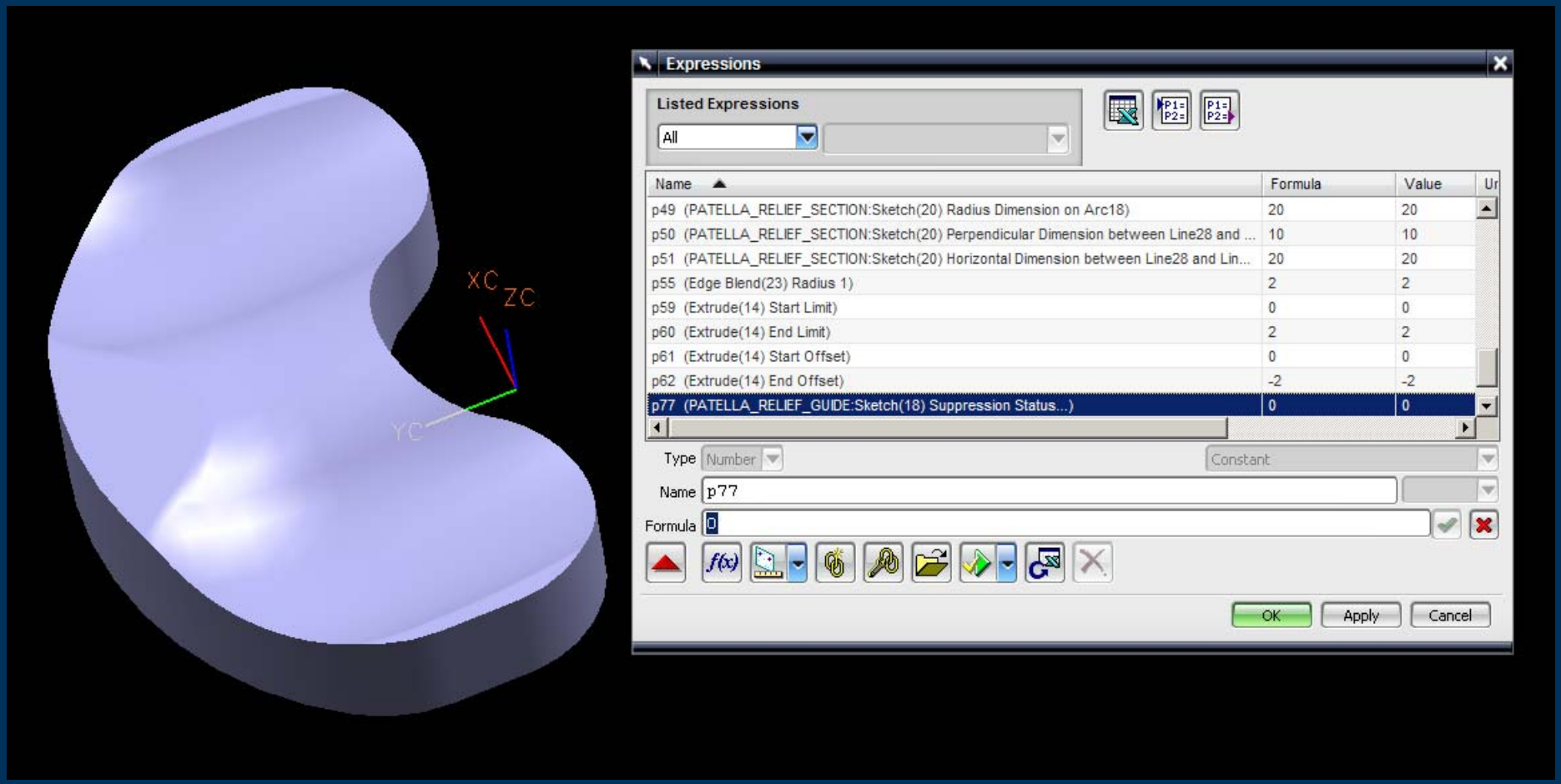
Global Search
- Type Keyword "expressions"
- Open "Expressions Overview"

Expressions Overview
- Expressions Overview
- General Concepts
- Dialog Fields
- Expressions Language
- Interpart Expressions

Suppress by Expression



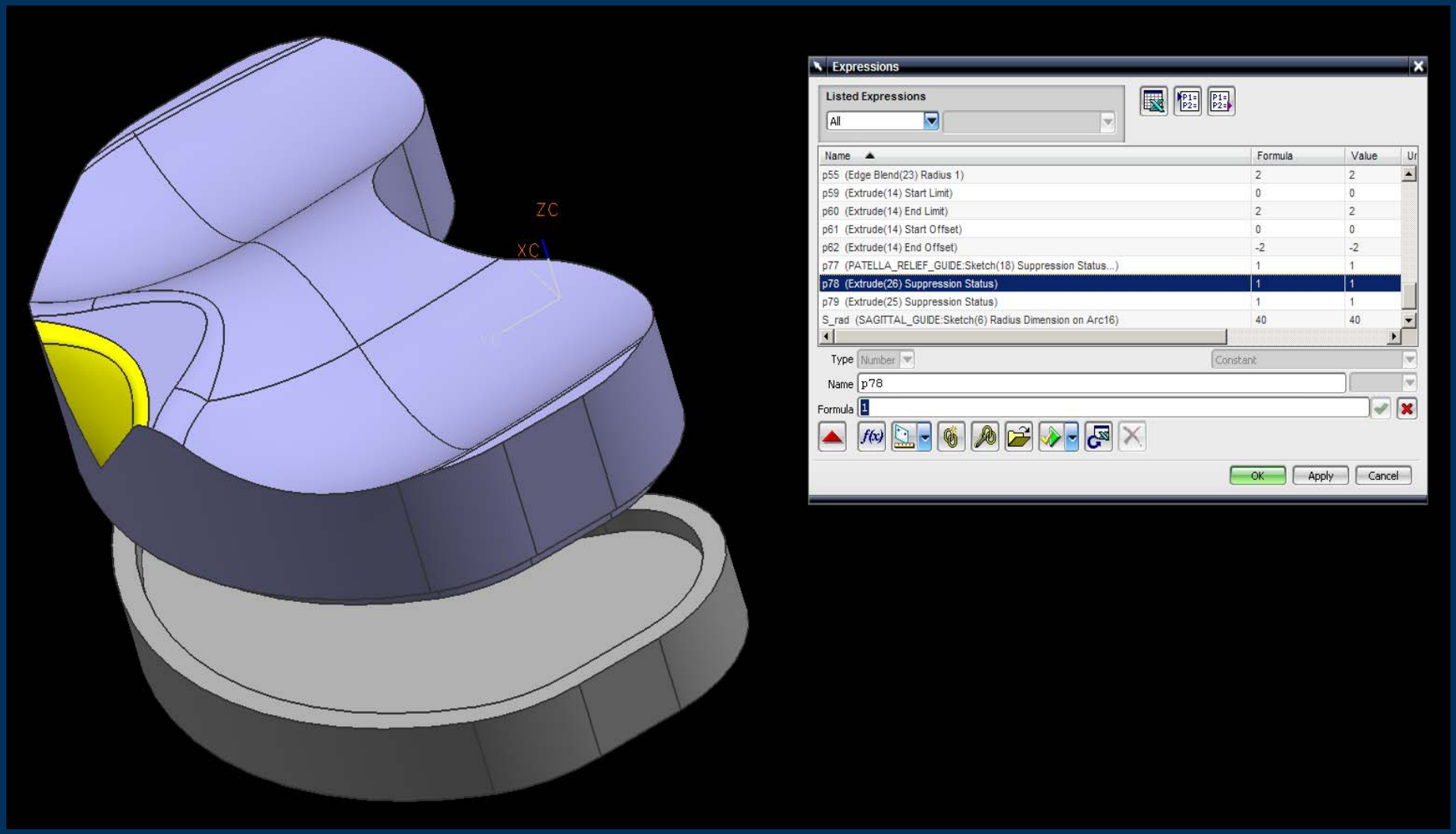
Suppress by Expression



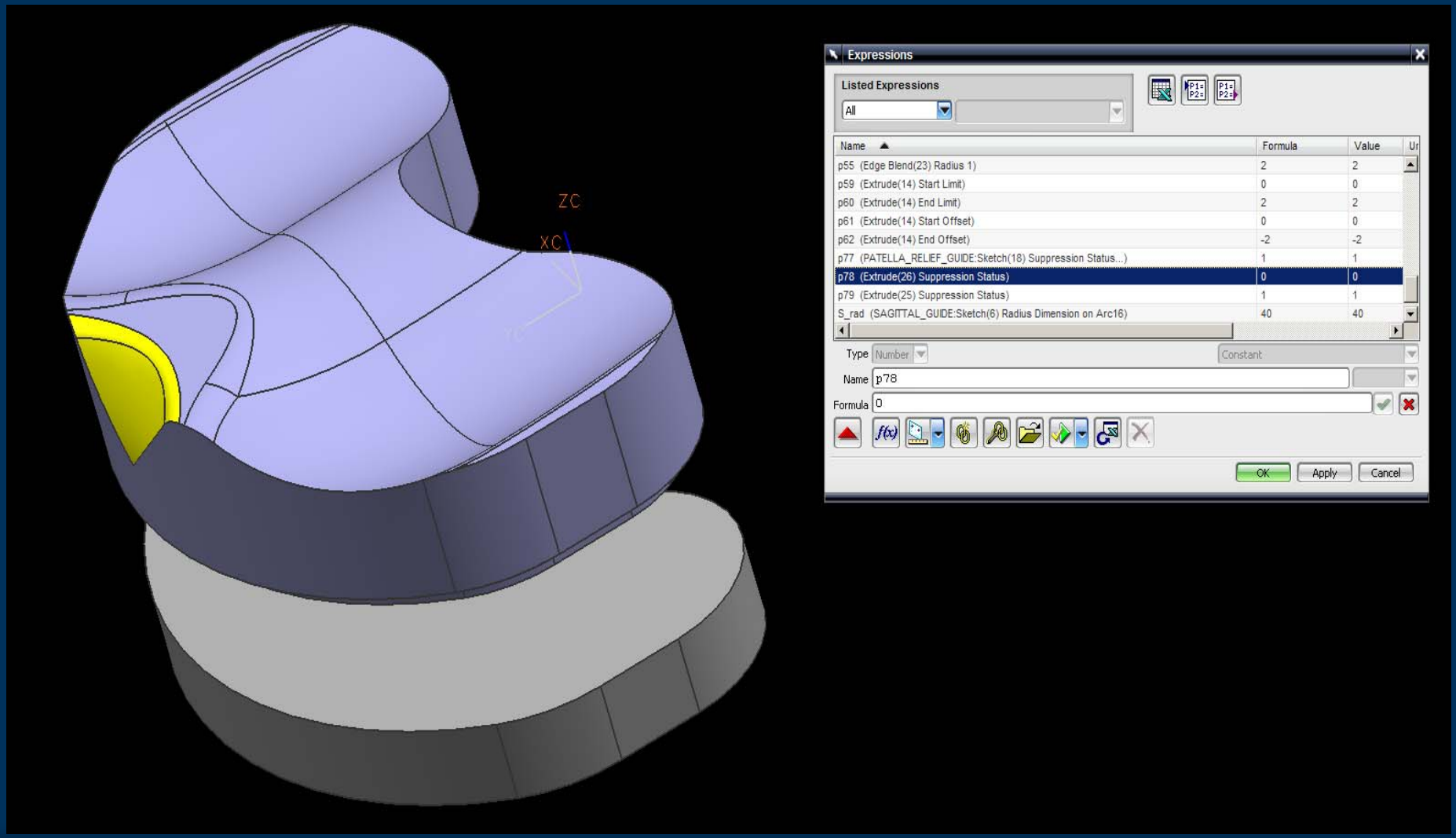
Expression Value = 1 (Feature is suppressed)

Expression Value = 0 (Feature is not suppressed)

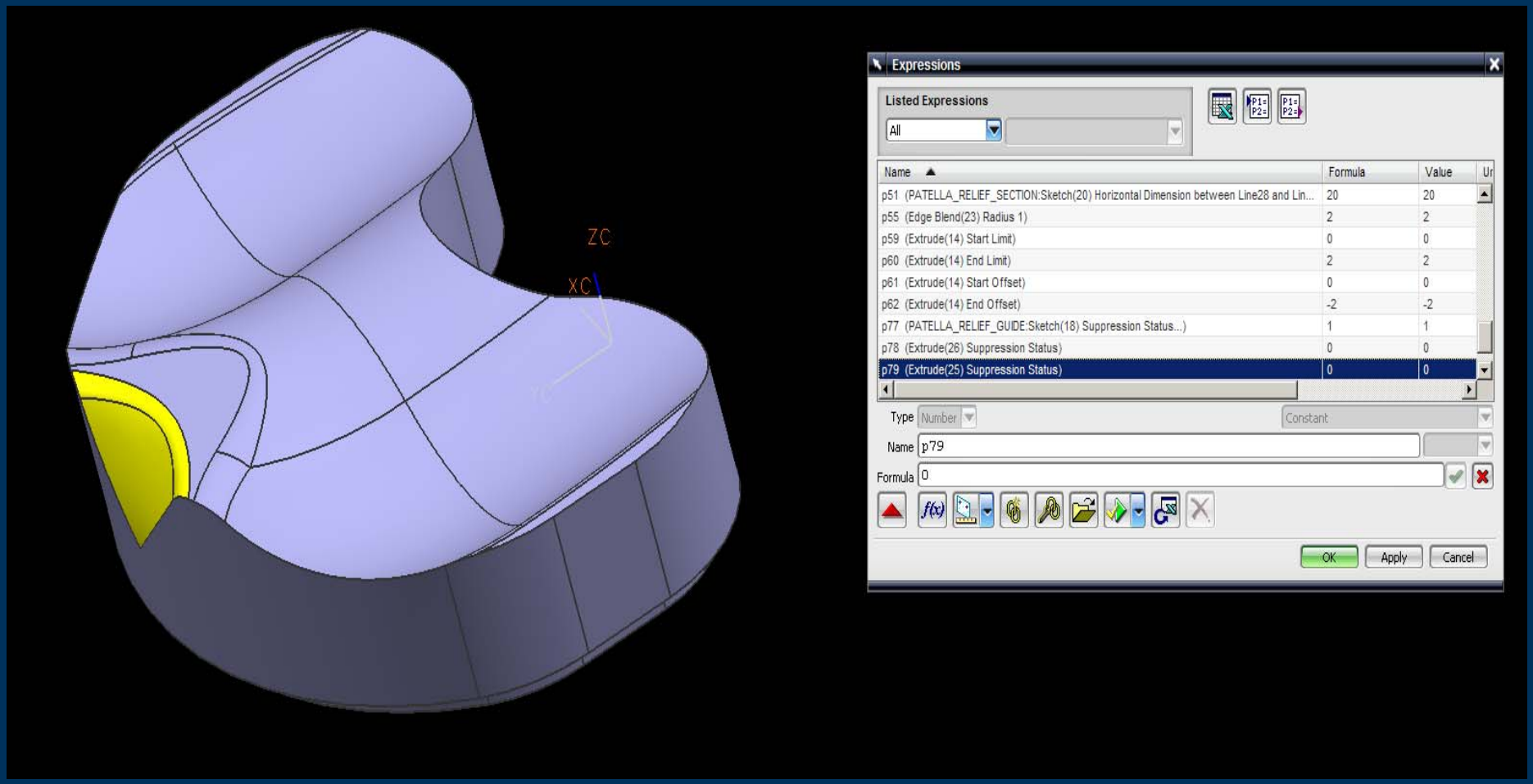
Suppress by Expression
Remove feature in Assembly



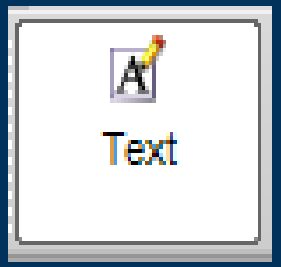
Suppress by Expression
Remove feature in Assembly

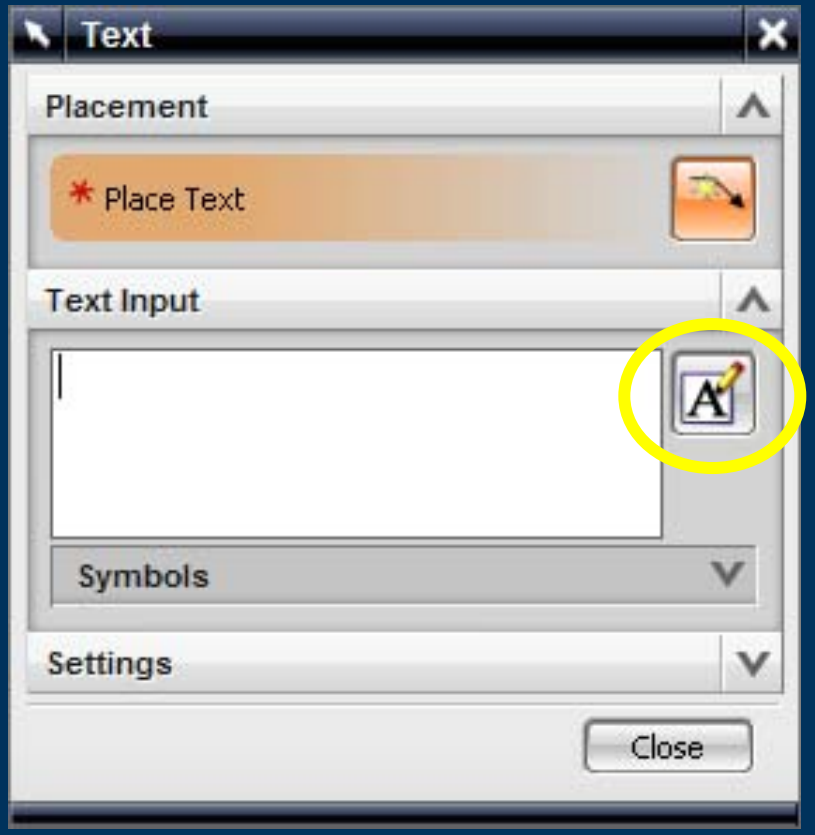


Suppress by Expression
Remove Component in Assembly

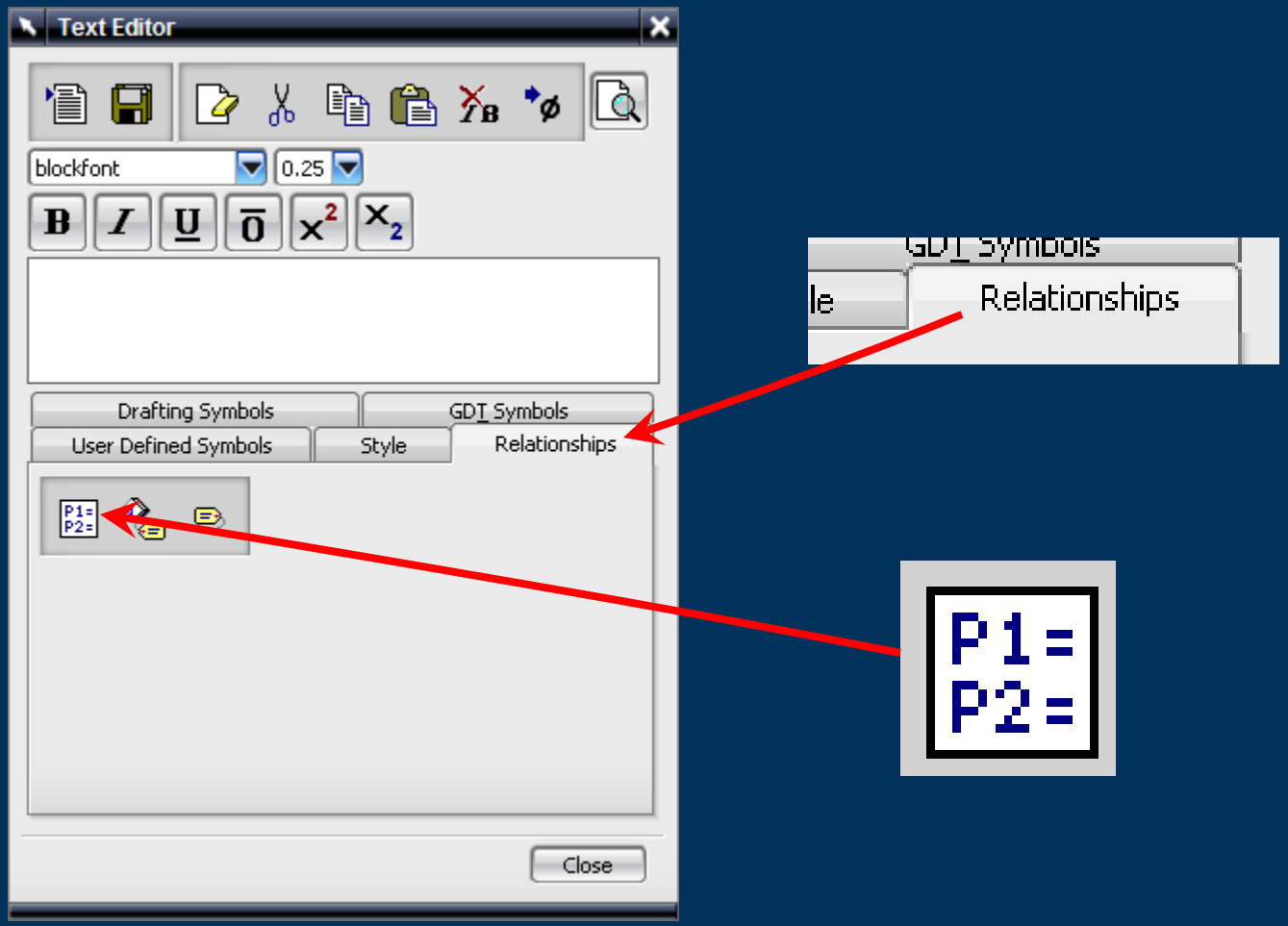


Expressions in Drafting

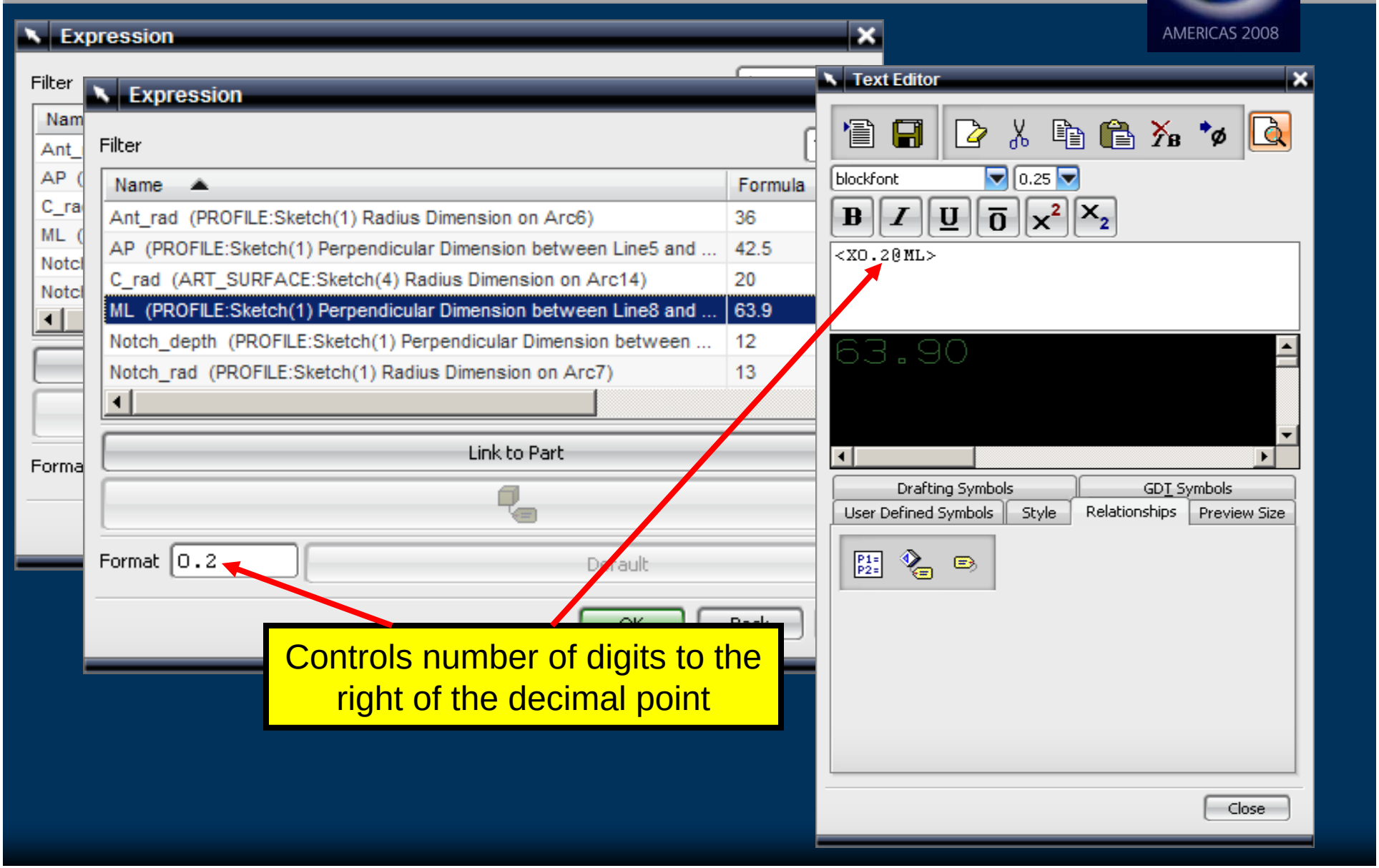




Expressions in Drafting

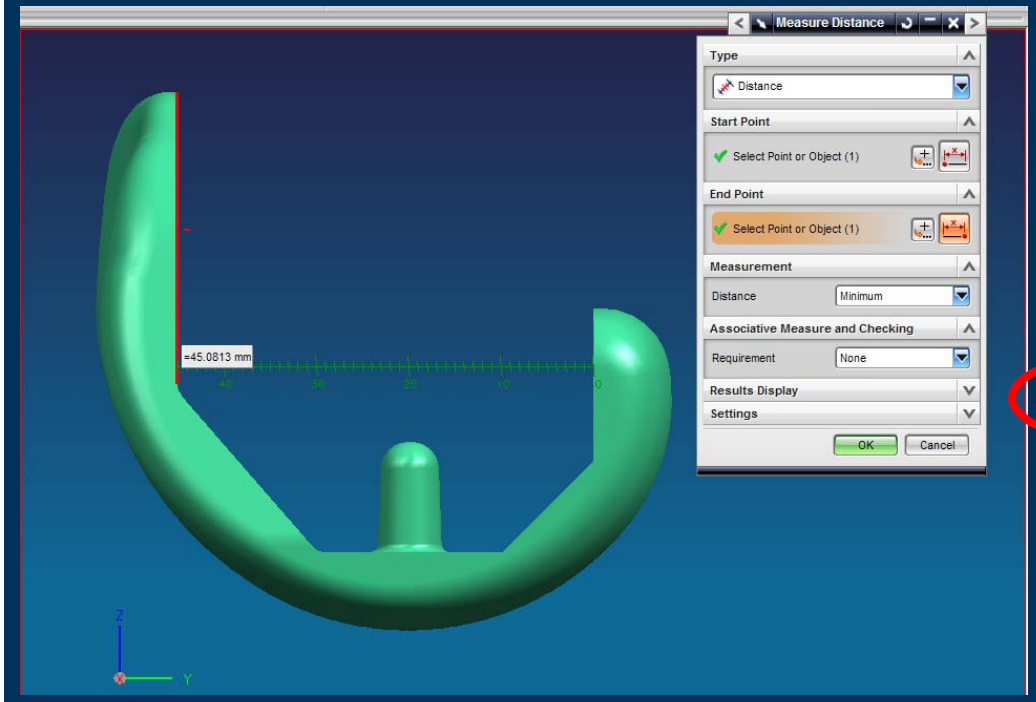


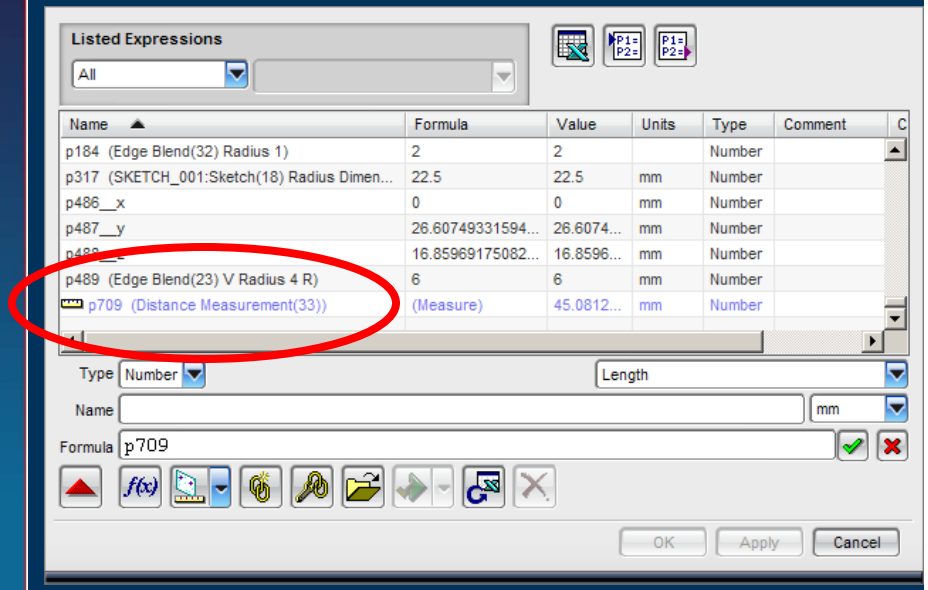
Expressions in Drafting



Geometric Expressions

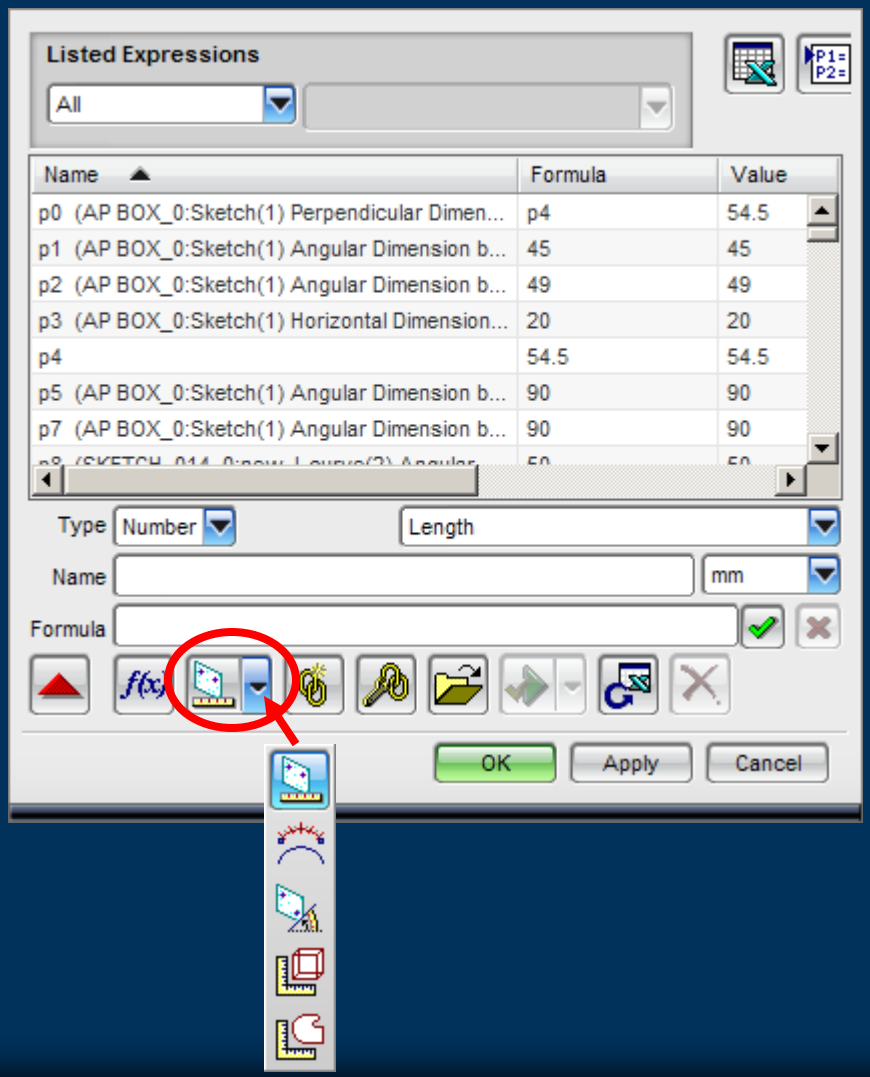
- Provides a way to capture associative geometric measurements of features in a part and record the information as an expression.

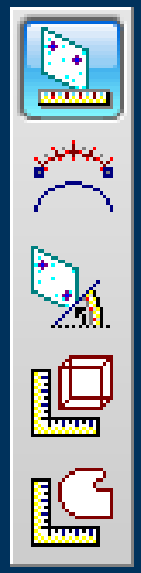




Geometric Expressions

- Measurement options





Distance

Arc Length

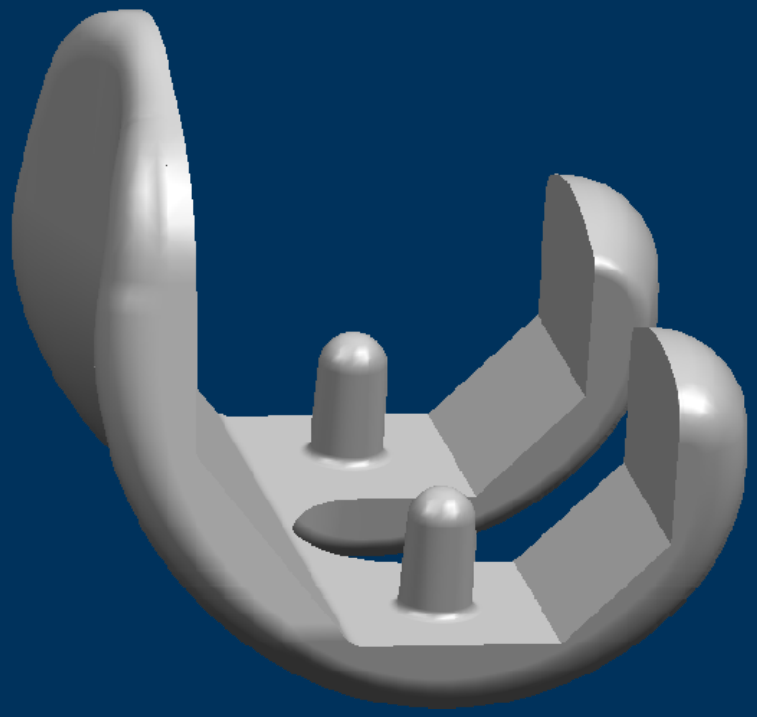
Angle

Body Measurements

Area Measurements

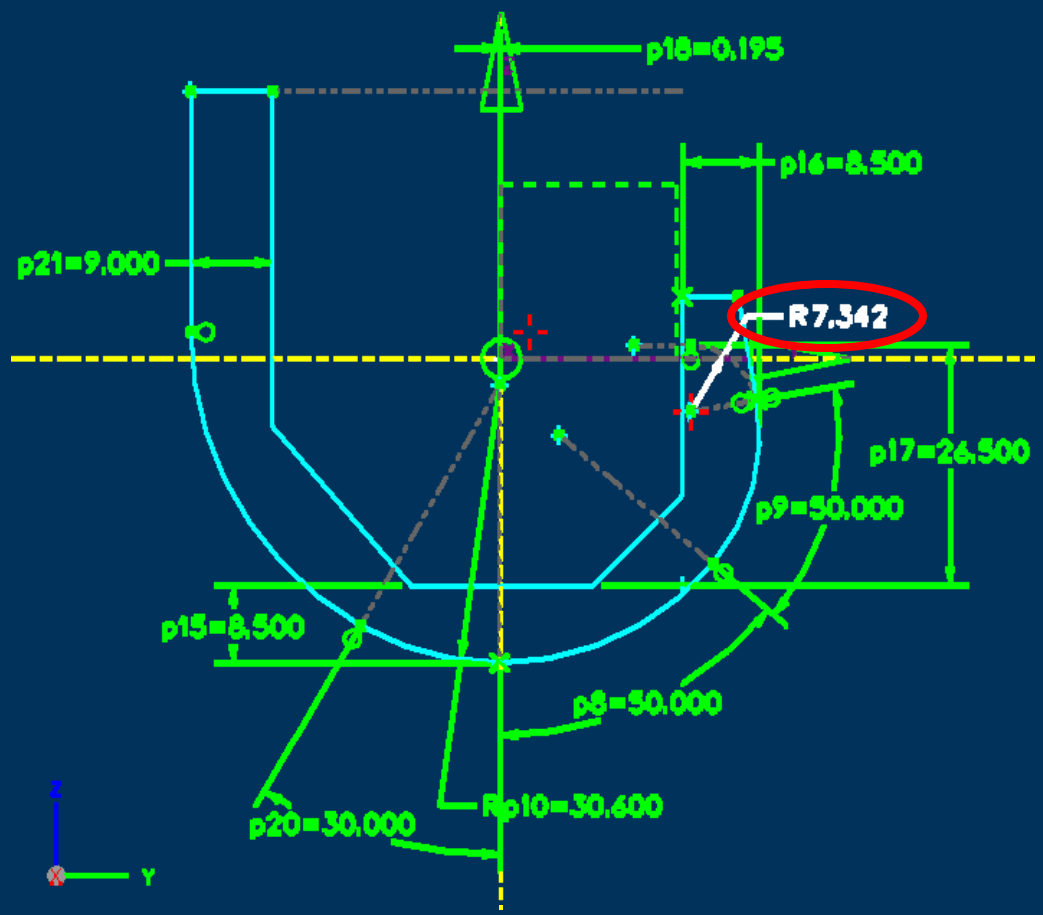
Geometric Expressions

- Practical application – femoral component

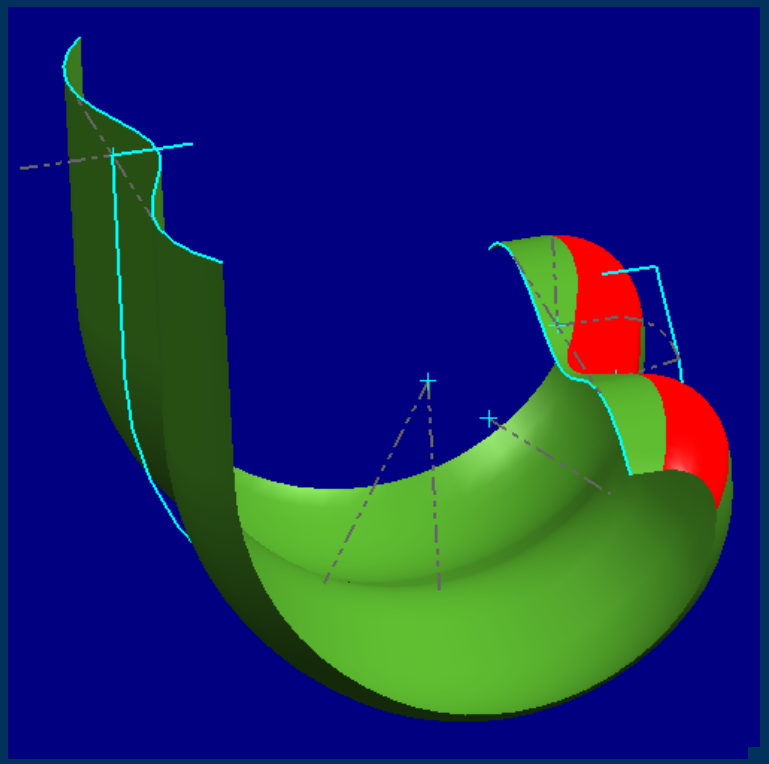


Geometric Expressions

- The Challenge

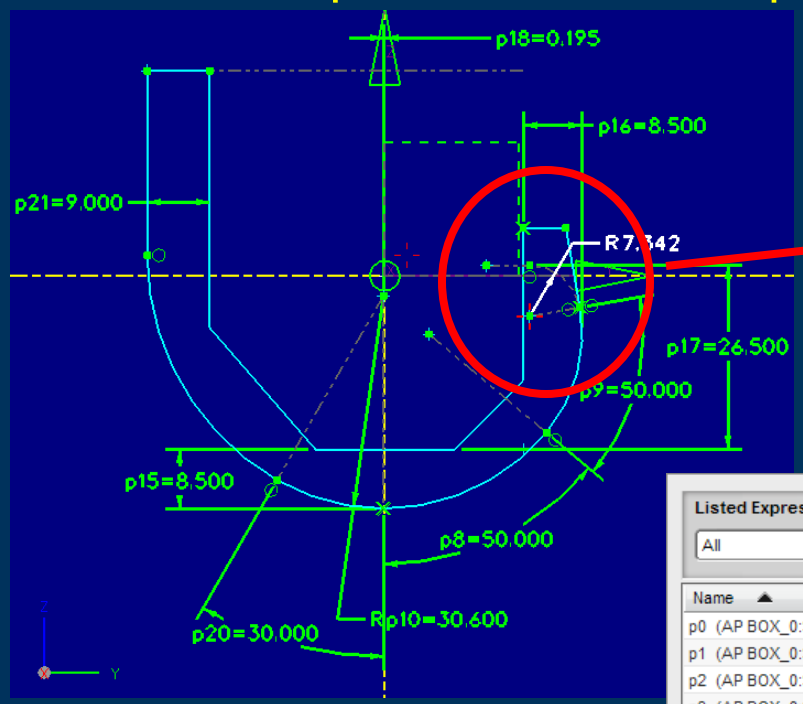


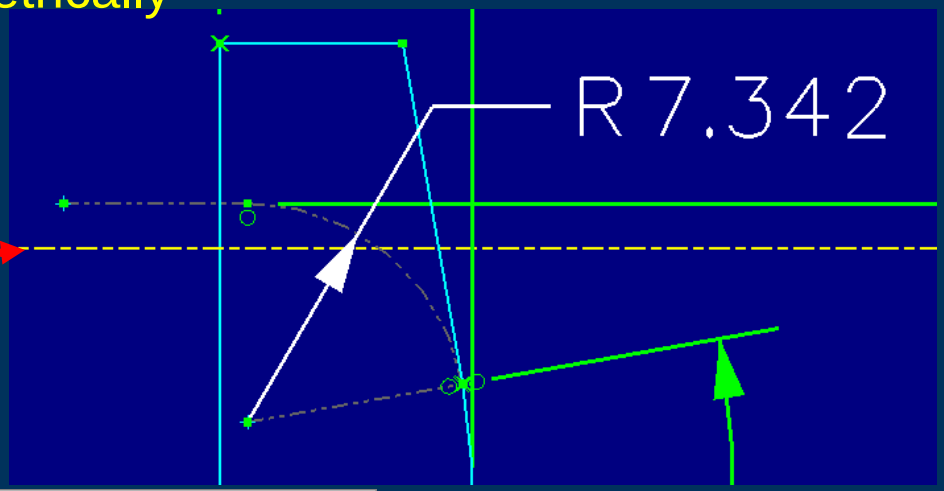
Reference dimension needs to drive blend radius value for a trimming sheet

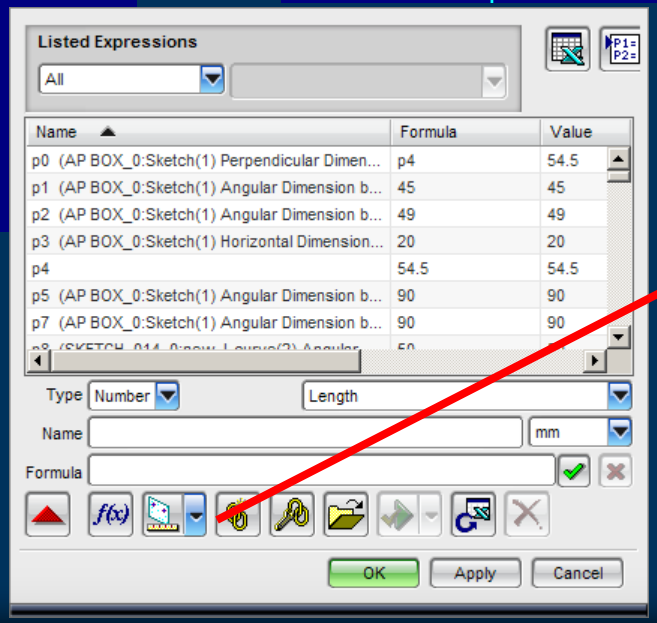


Geometric Expressions

- Capture radius value parametrically

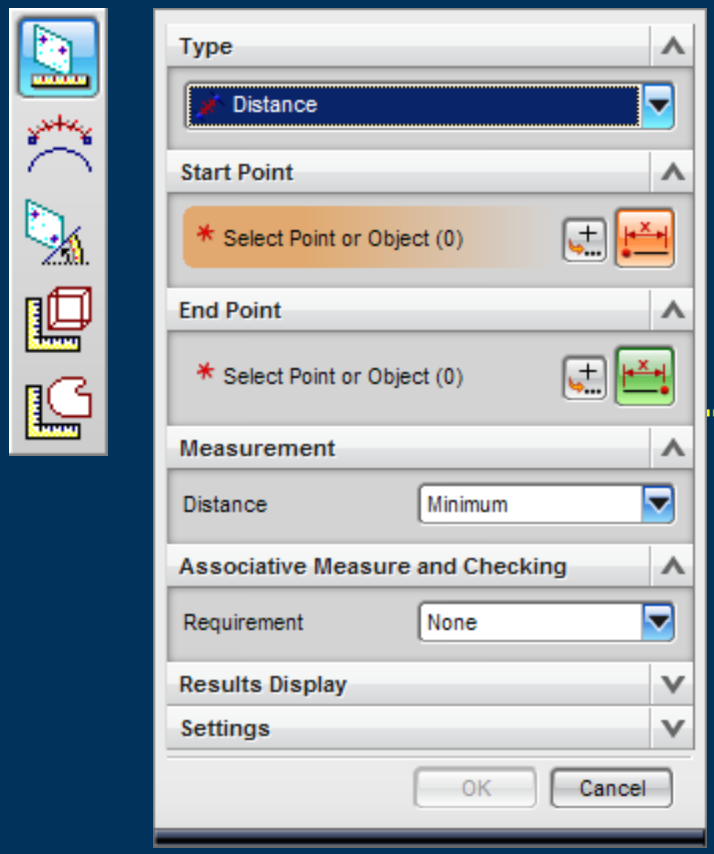


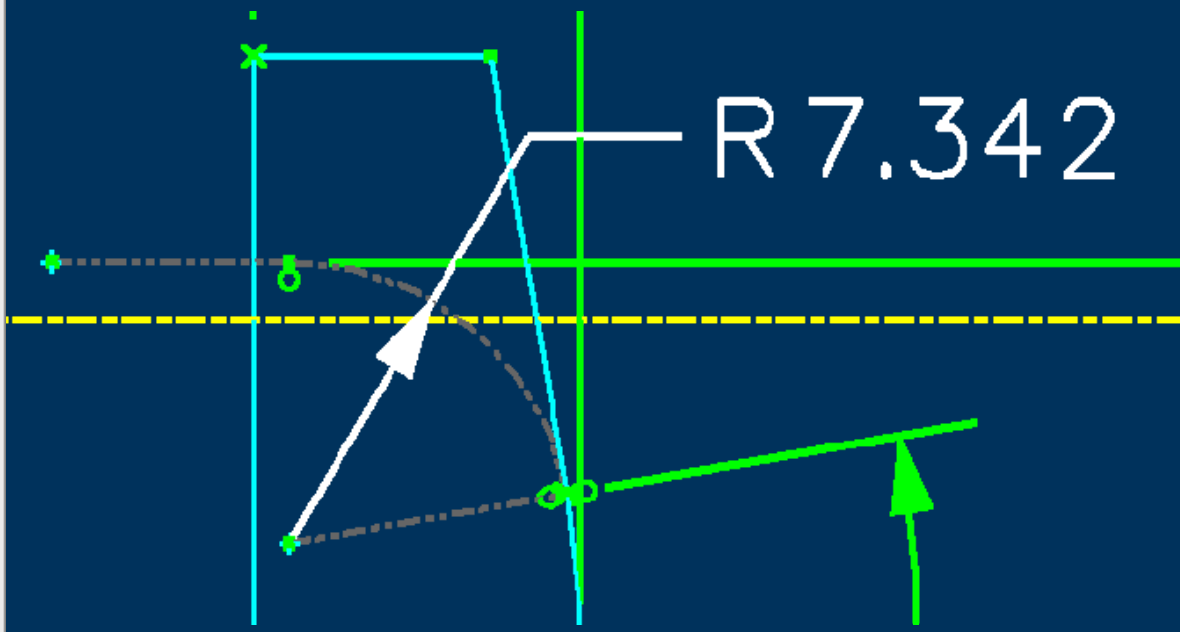




Geometric Expressions

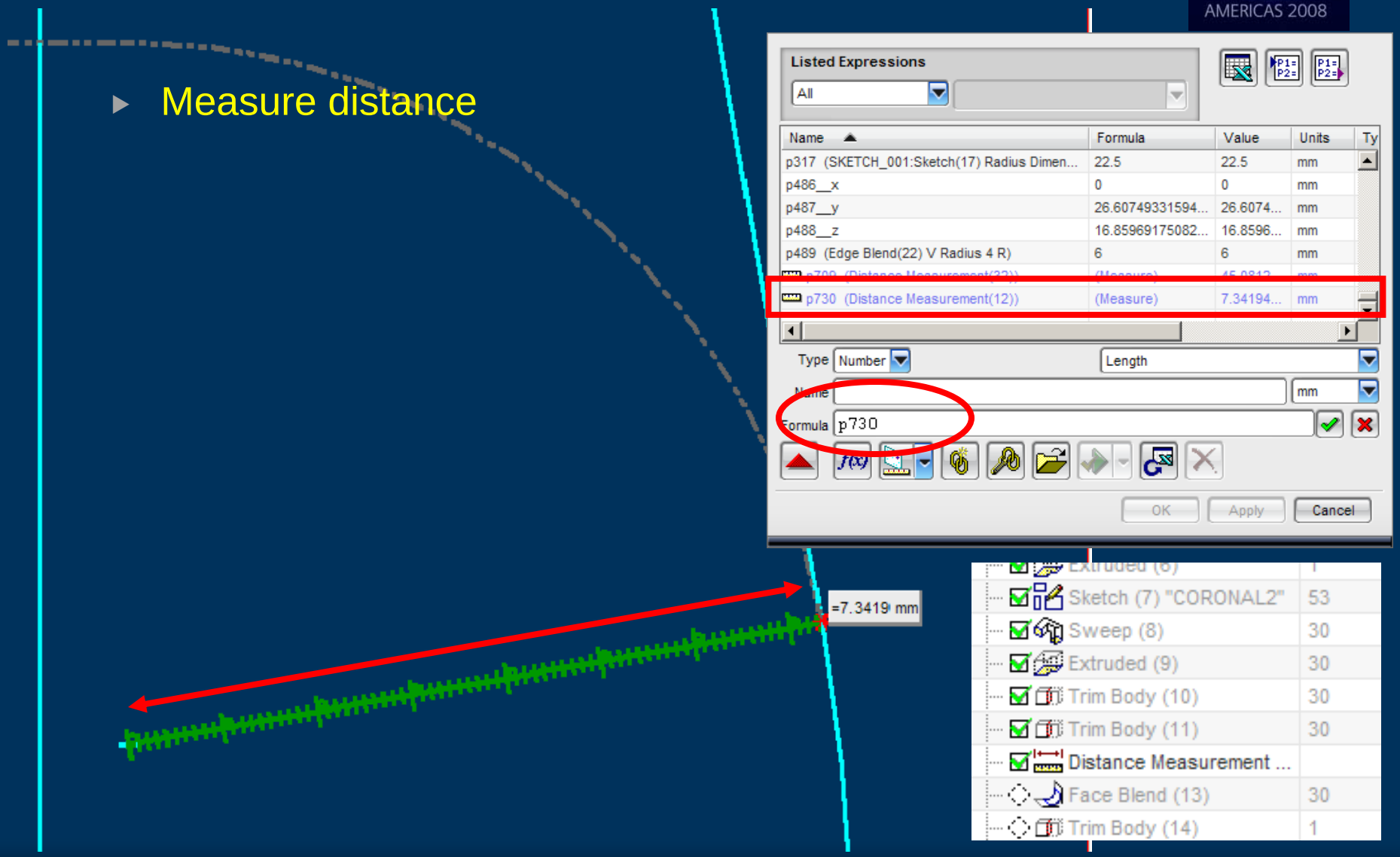
- Capture radius value parametrically





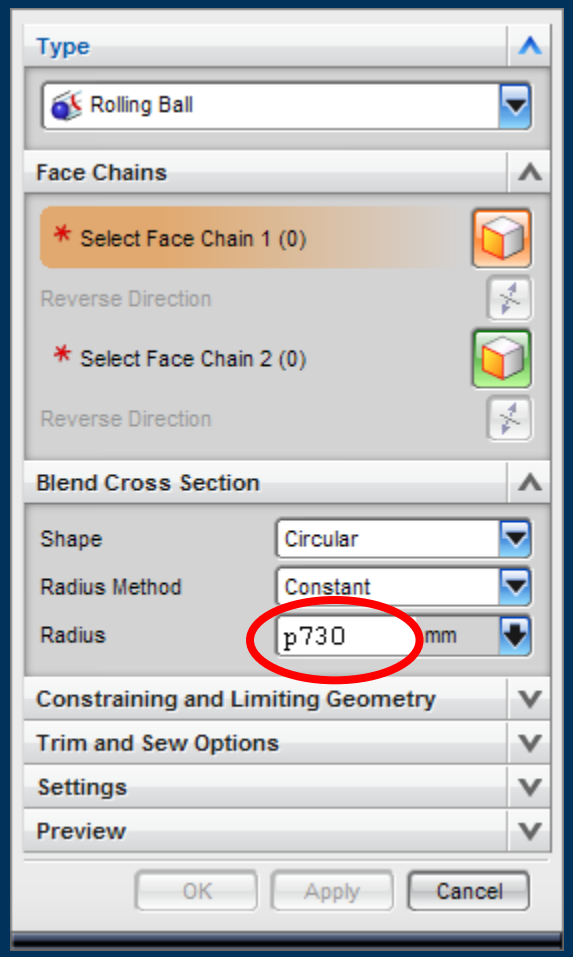
Geometric Expressions

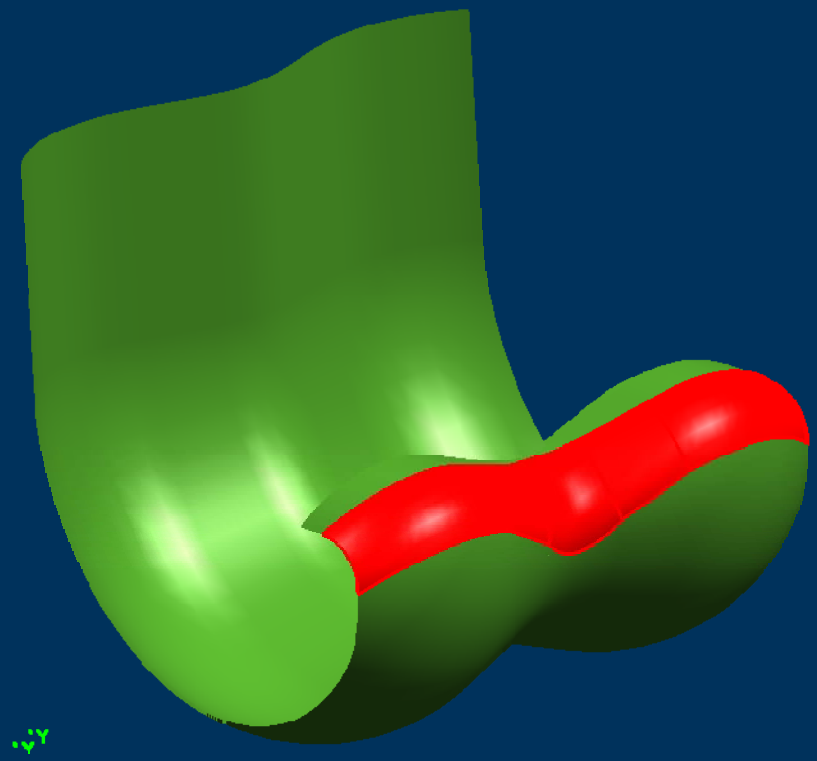
- Measure distance



Geometric Expressions

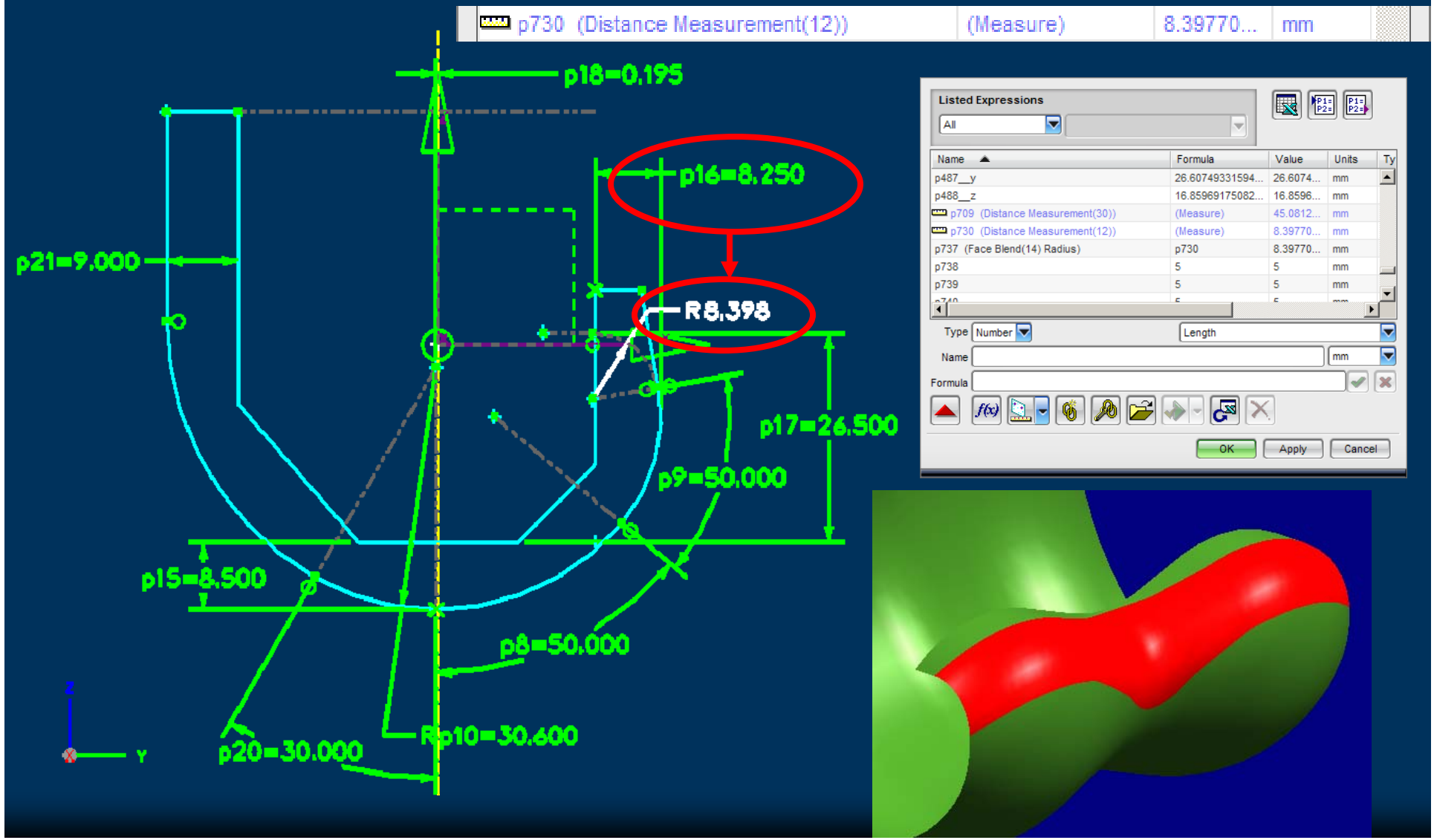
- Use distance expression to control blend





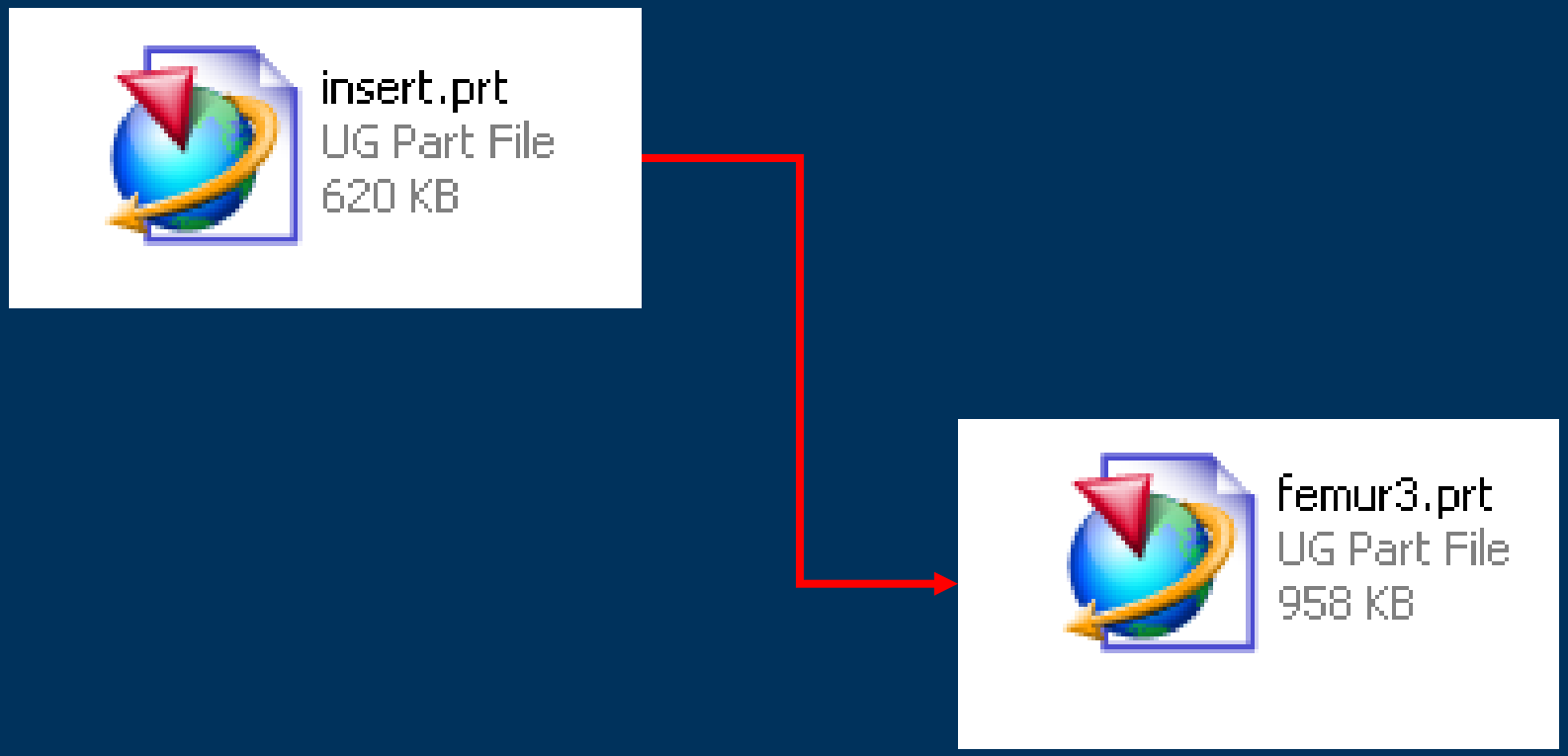
Geometric Expressions

- Verify associativity



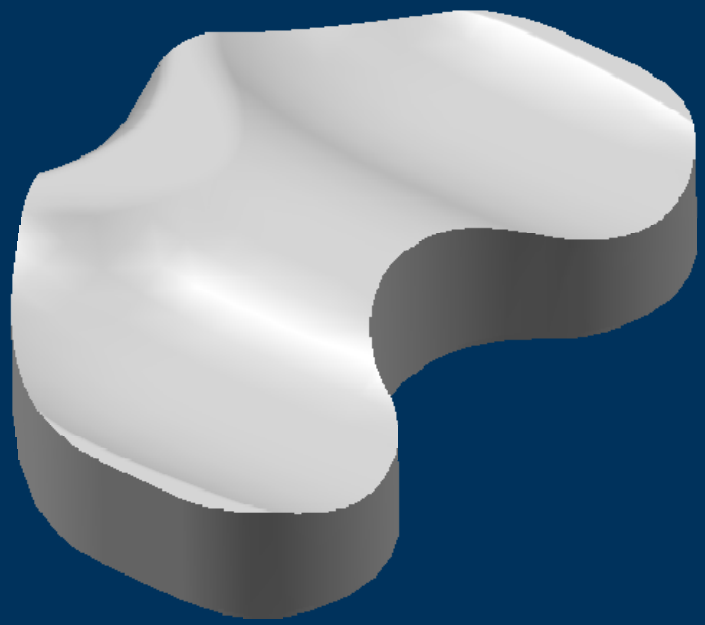
Interpart Expressions

- Provides a method of relating expressions in one part file to expressions residing in a separate part file



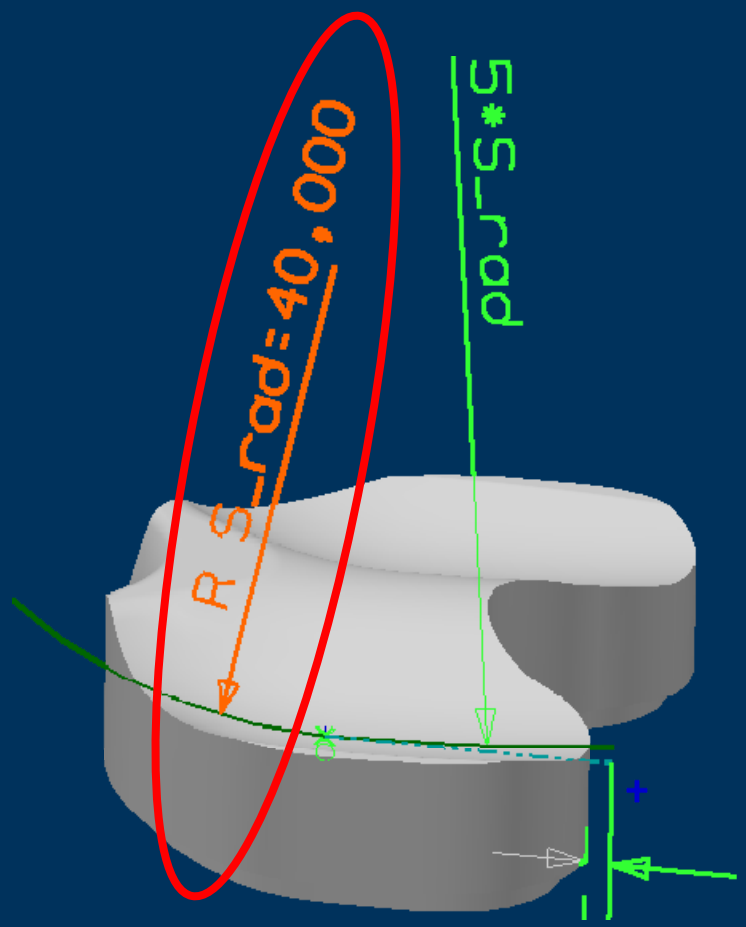
Interpart Expressions

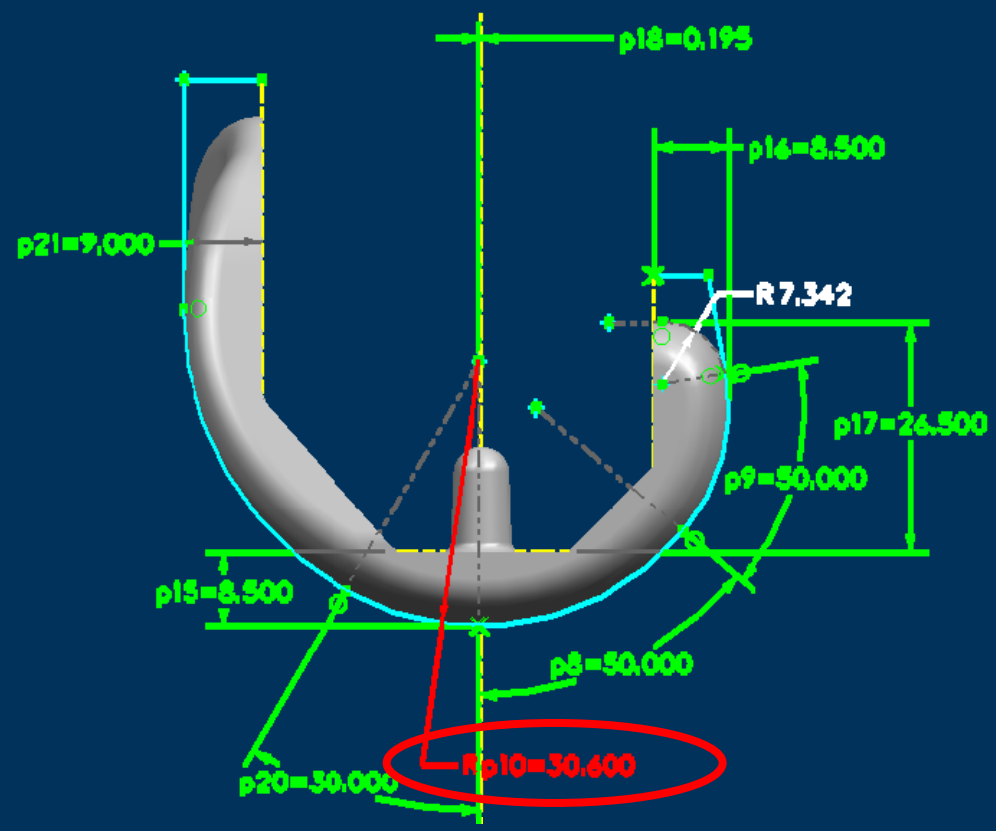
- Practical application – Tibial insert



Interpart Expressions

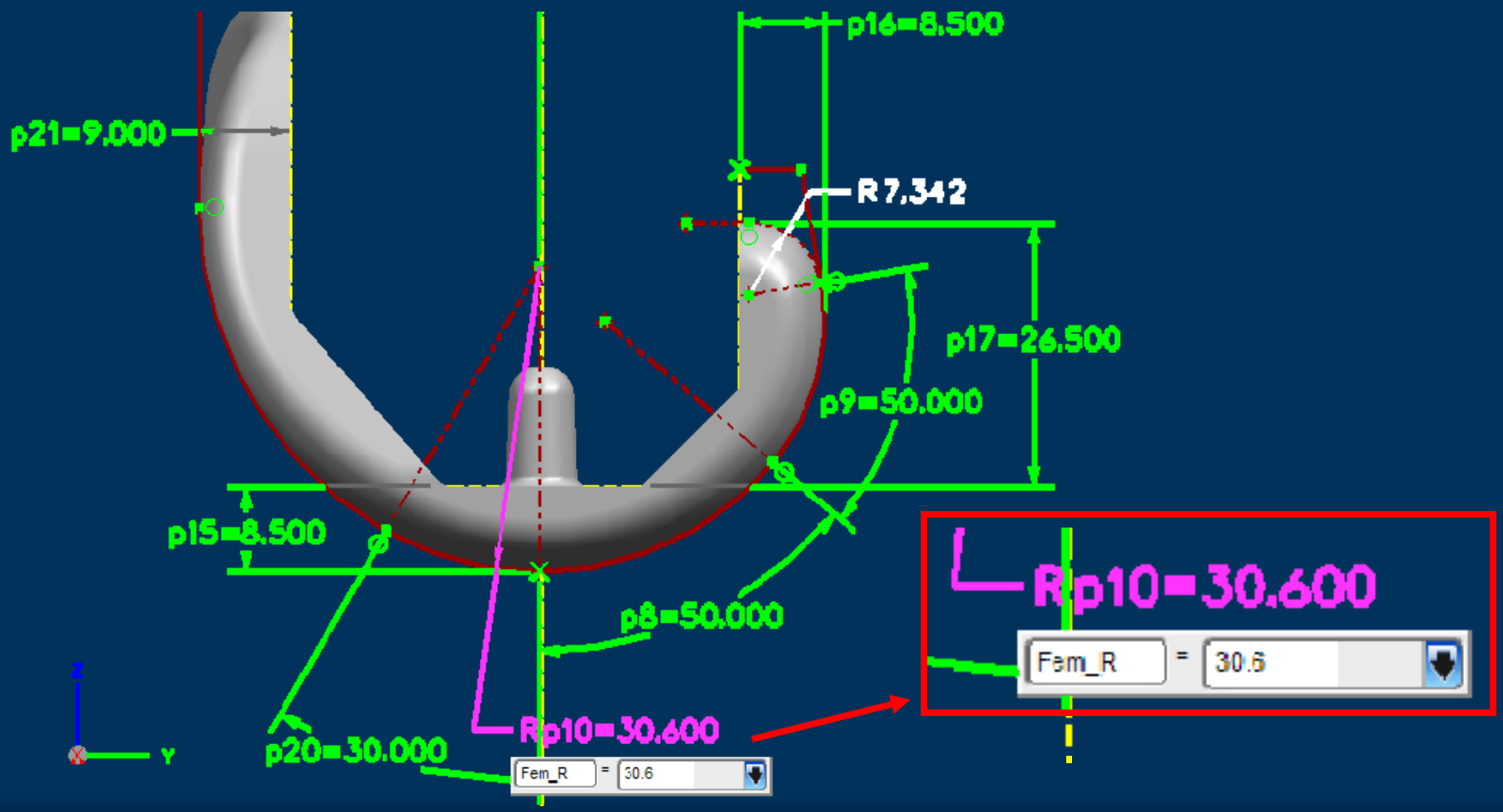
- Design Requirement: The tibial insert radius should be 30% larger than the femoral radius





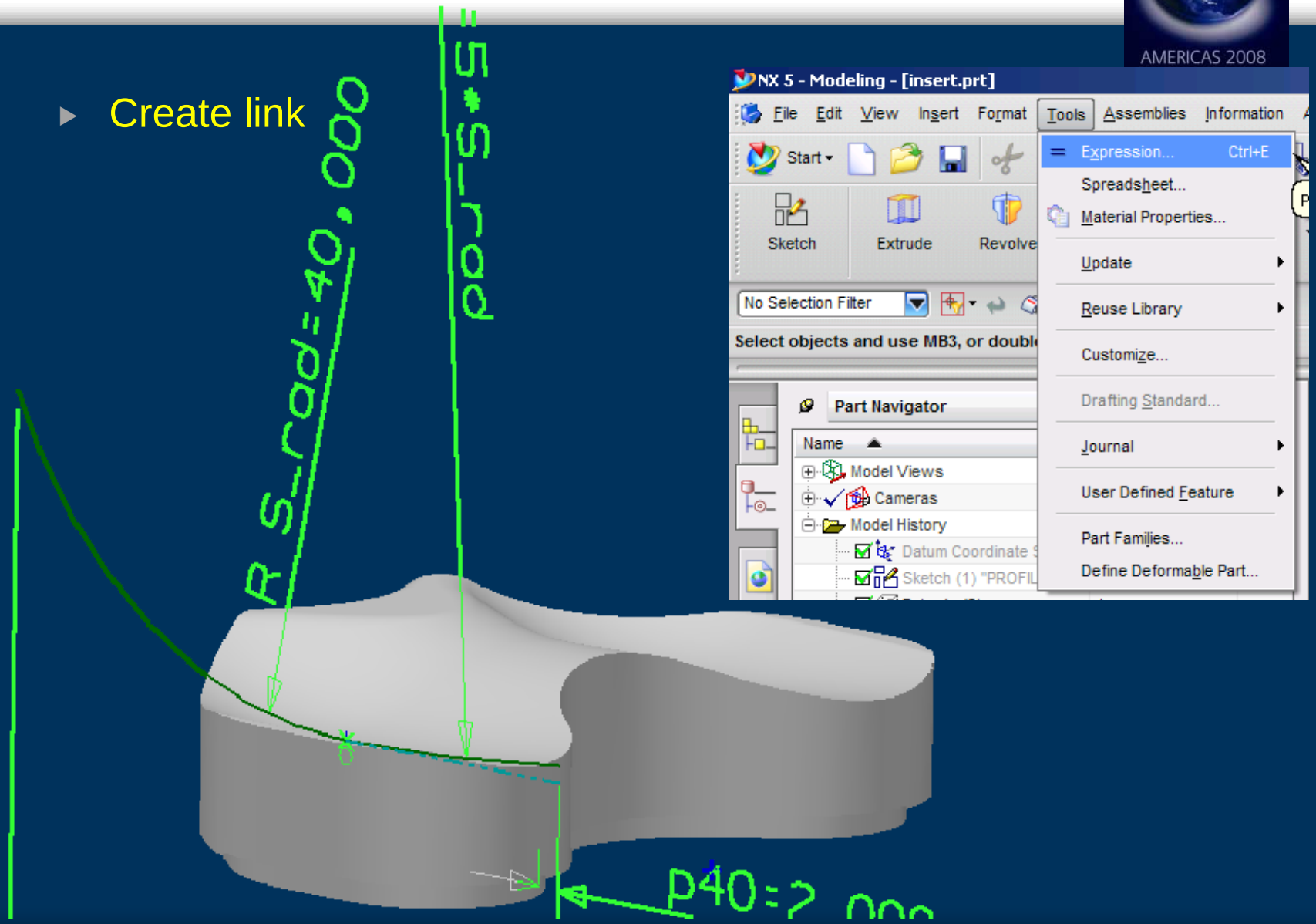
Interpart Expressions

- Helpful hint : Name expressions for easy identification.

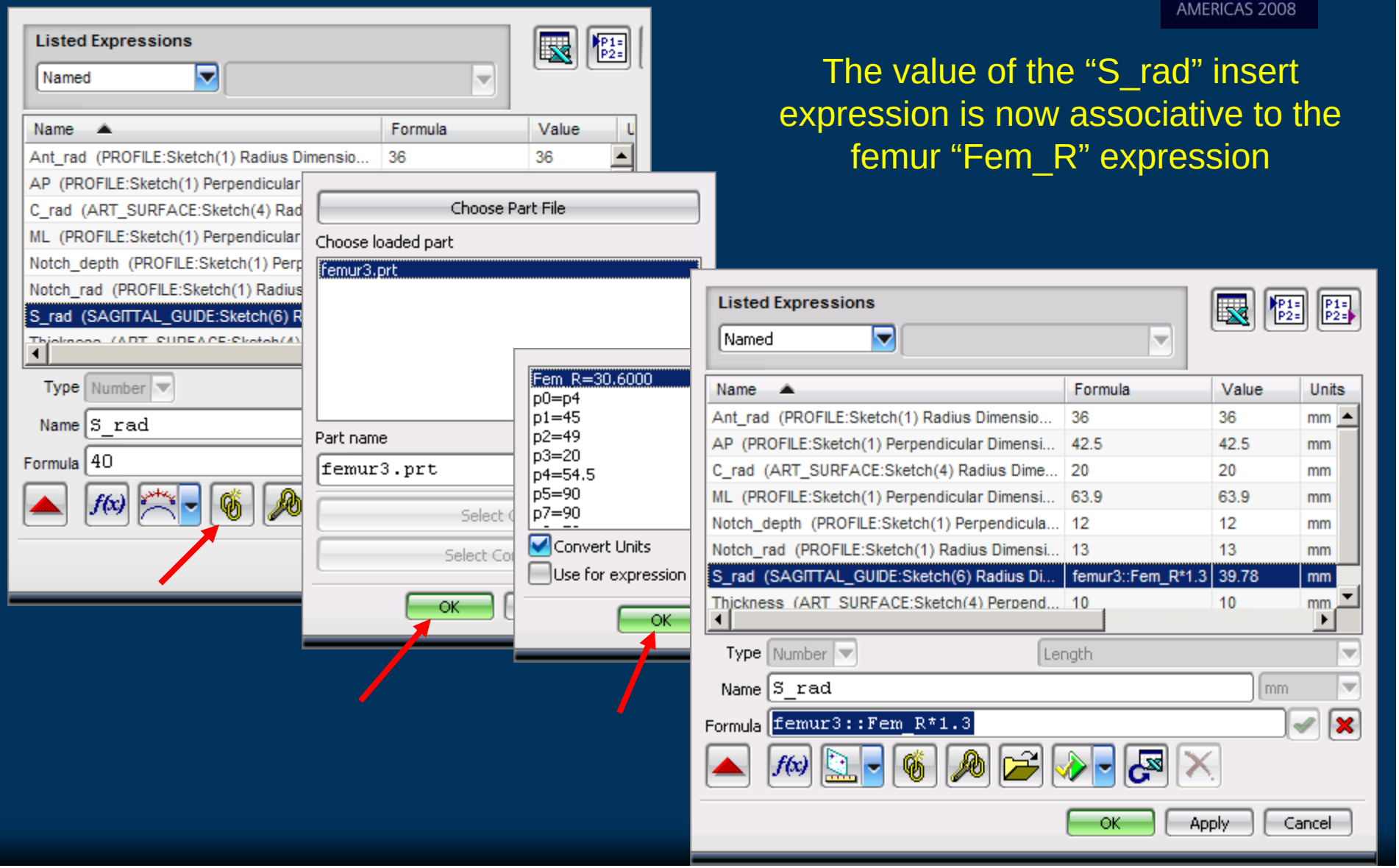


Interpart Expressions

- Create link



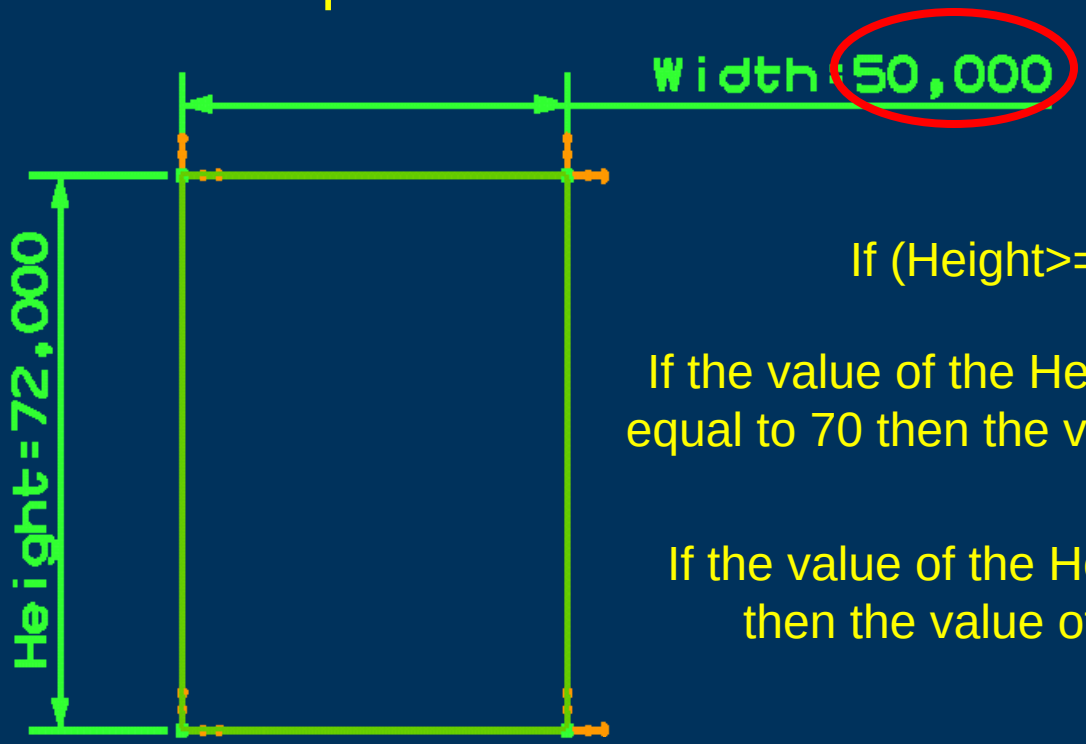
Interpart Expressions



The value of the “S_rad” insert expression is now associative to the femur “Fem_R” expression

Conditional Expressions

- Provides a means to use logical statements and/or a set of conditions to control the value of an expression.



If (Height>=70)(50) else(30)

If the value of the Height expression is greater than or equal to 70 then the value of the width expression is 50.

If the value of the Height expression is less than 70 then the value of the width expression is 30.

Conditional Expressions

Key Tips

- Syntax is critical — If (Height>=70)(50) else(30)
- Spelling and case is critical — Height is not the same as height
- Use two “=“ signs when needed — If (Height==70)(50) else(30)

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Presented by
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