Introduction to Materials in AutoCAD 2015

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About the Speaker

- *I’m a professor at Kankakee Community College.*
- *I have 18 years of CAD teaching experience at universities and colleges.*
- *My professional experience covers the span of over 30 years, including 13 years of expertise in managing all aspects of the CAD function for large organizations with multiple engineering disciplines, and remote offices such as AECOM and STS Consultants.*

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Cell Phones

- Please set your cell phones to silent or meeting mode!

Class Summary

A material is simply an image stretched over an object to make it appear as if the object is made out of various materials such as wood, marble, brick, metal, plastic, or glass. Once the material has been applied, you will learn how to adjust how the material is mapped to the object. Using visual styles, you can immediately see the effects of the materials or you can render the scene to see the full effects. This class will explore the methods of creating new materials that can be added into your scene.

Key learning objectives

At the end of this class, you will be able to:

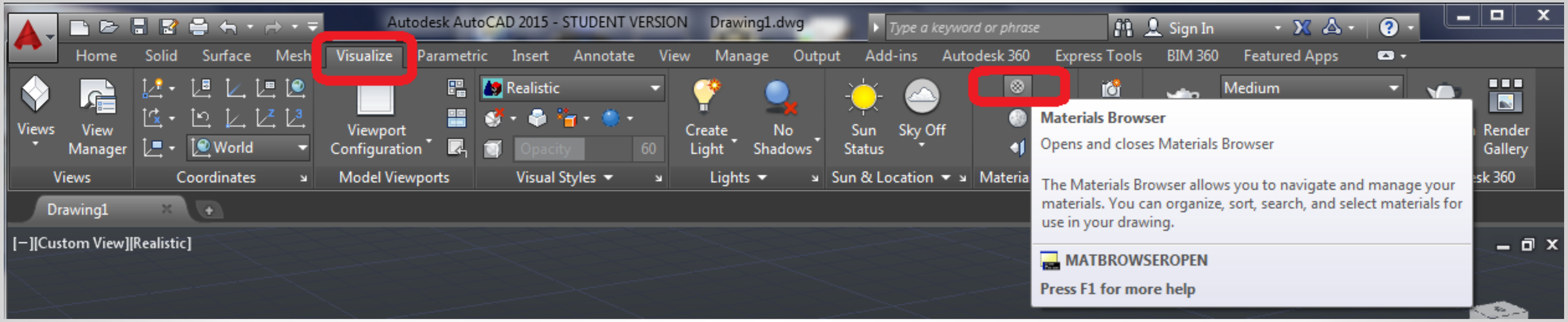
- Learn to attach materials to and remove materials from 3D objects in a drawing
- Learn how to change the properties of existing materials
- Learn how to adjust materials maps
- Learn how to create and modify materials

Agenda

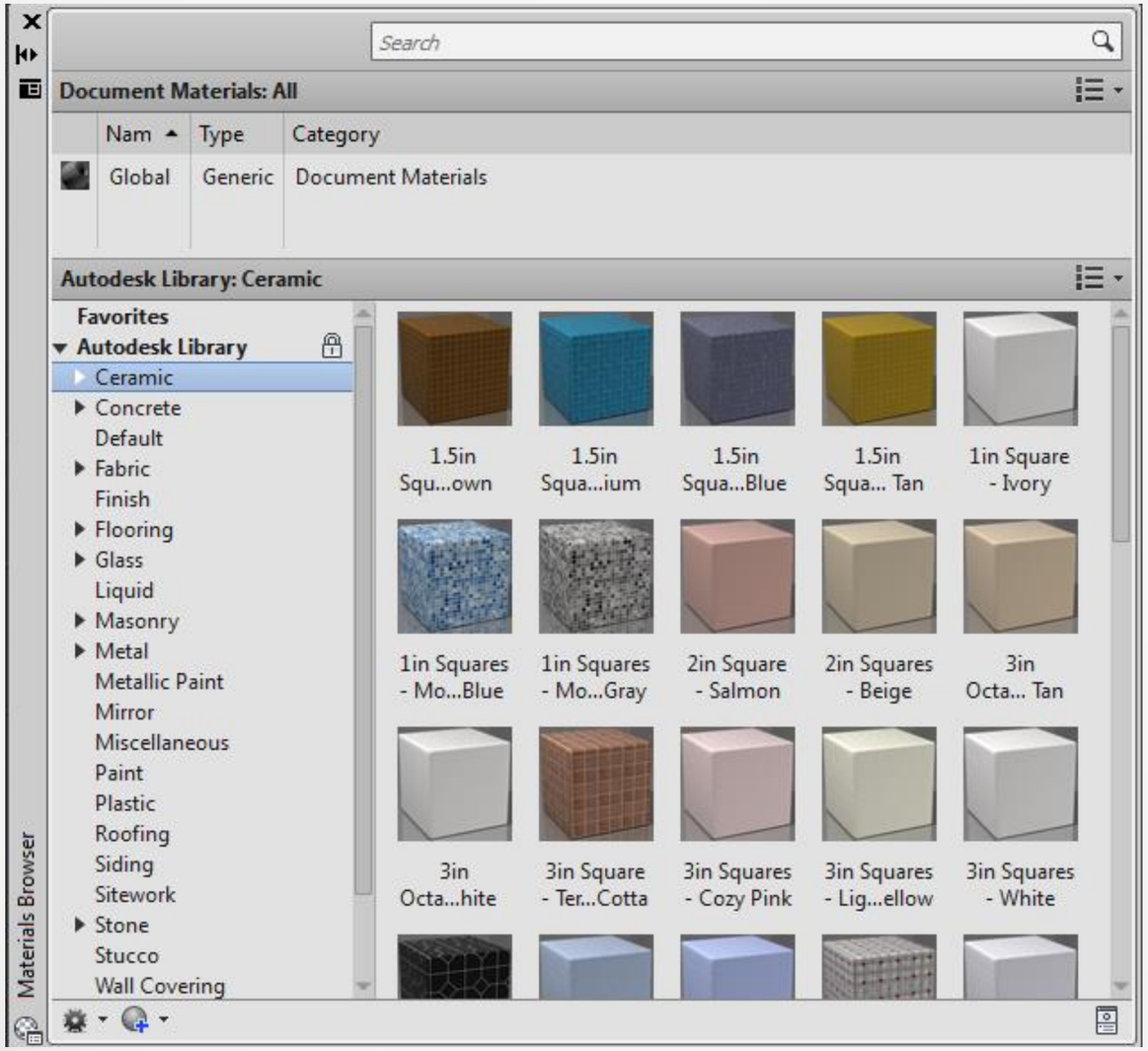
- Adding and Removing Materials
- Changing the Properties of Existing Materials
- Adjusting Material Maps
- Create and Modify Materials
- Door Prizes
- Questions and Answers

Attaching and Removing Materials

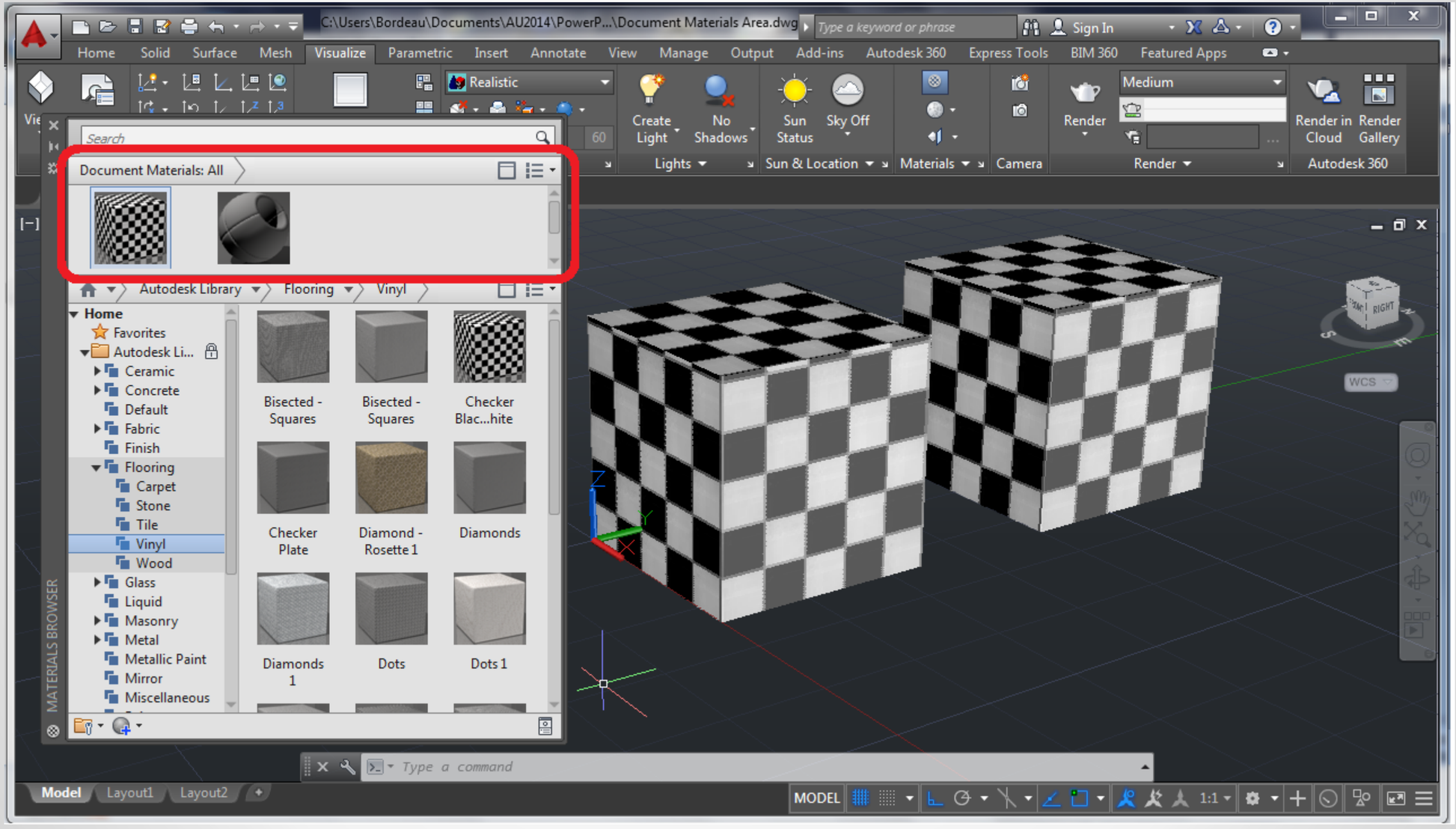
Materials Browser



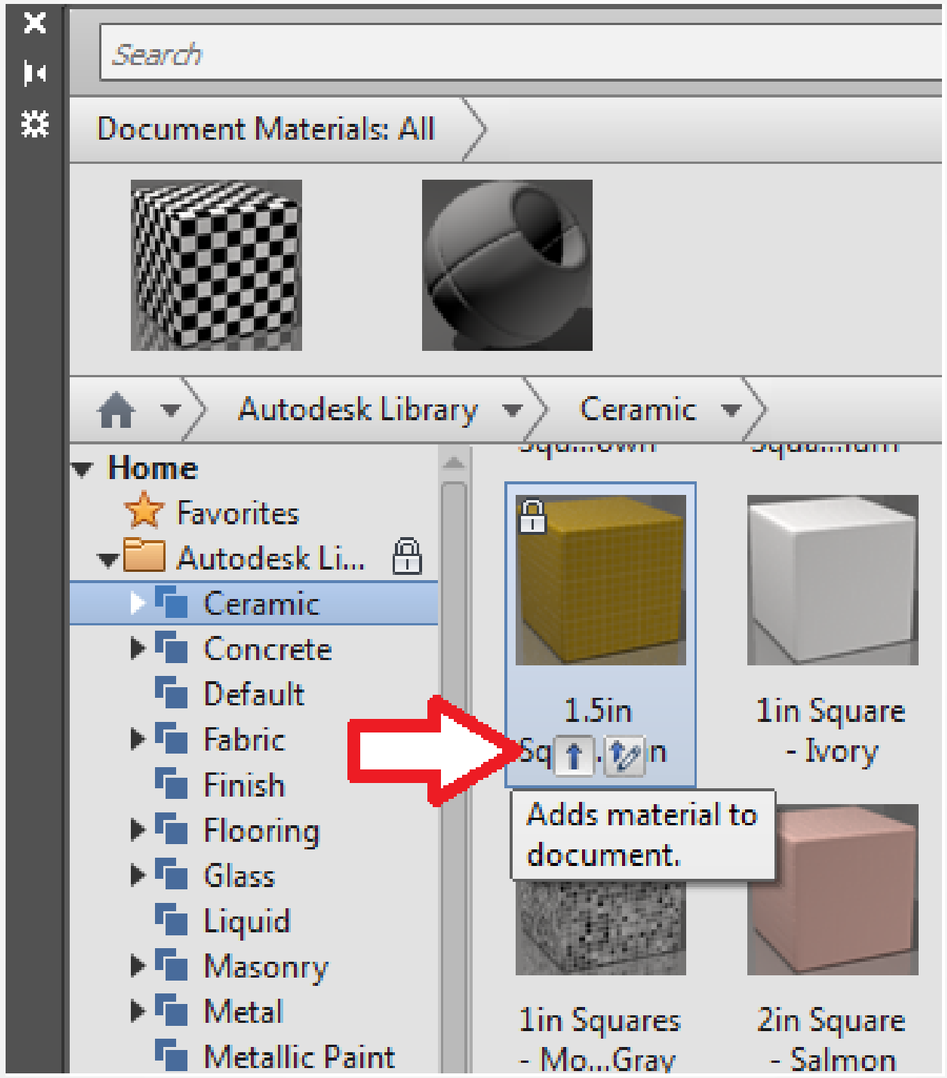
Materials Browser



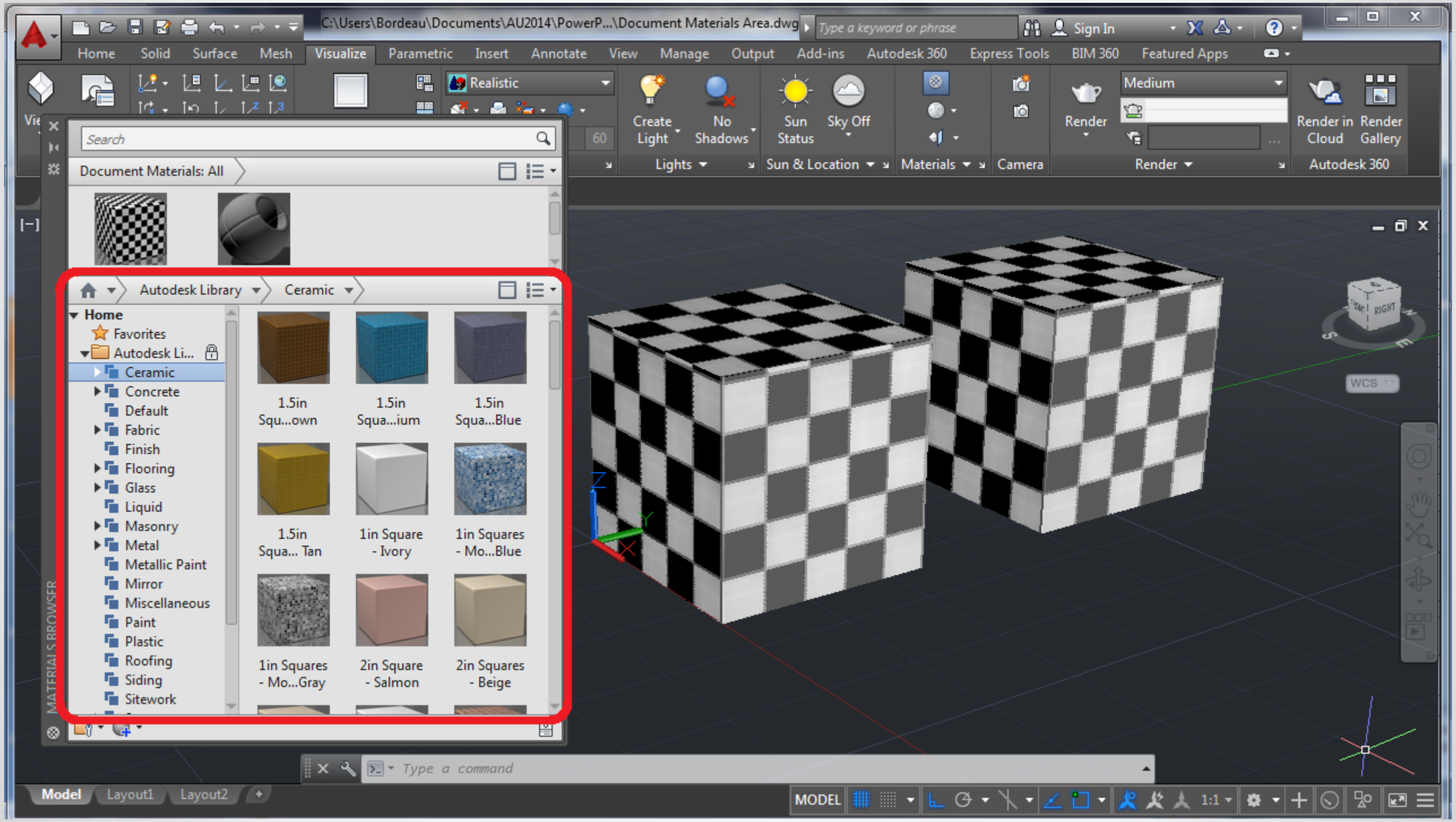
Document Materials Area



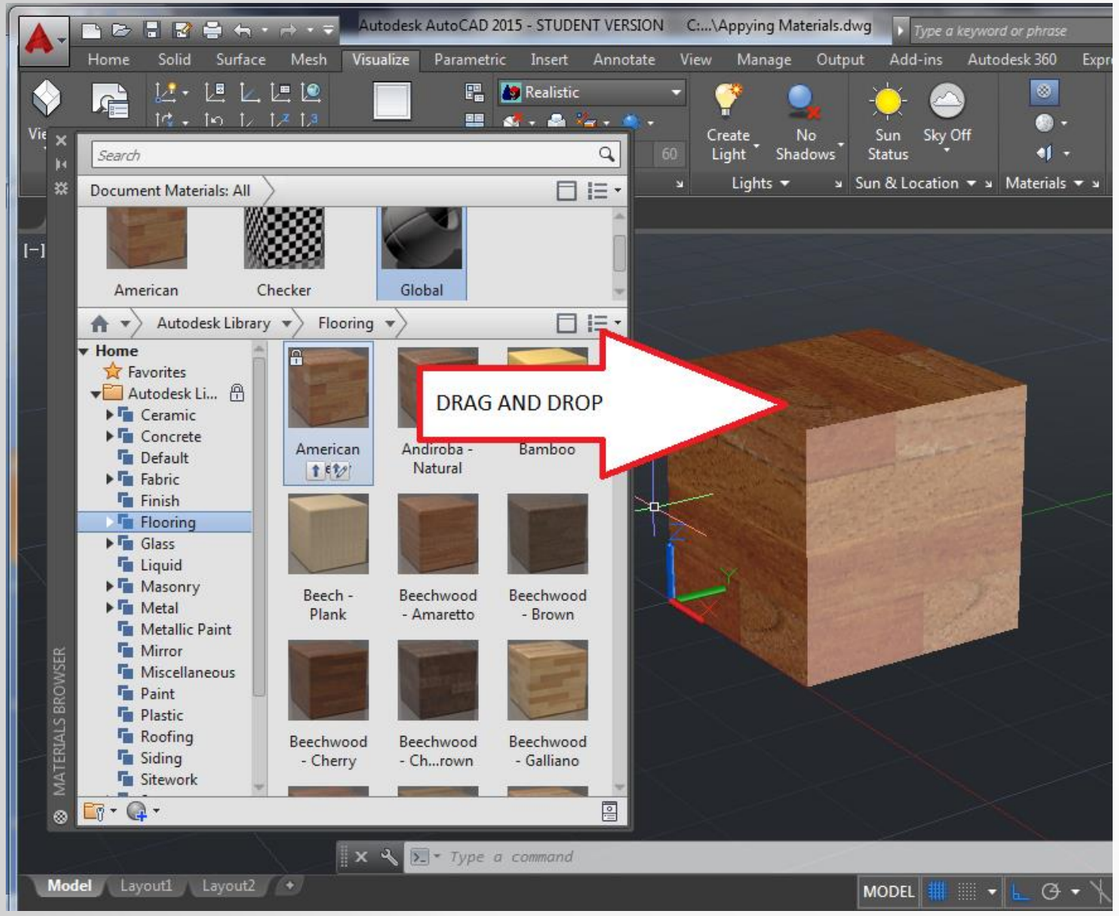
Materials Browser – Add Materials to Document

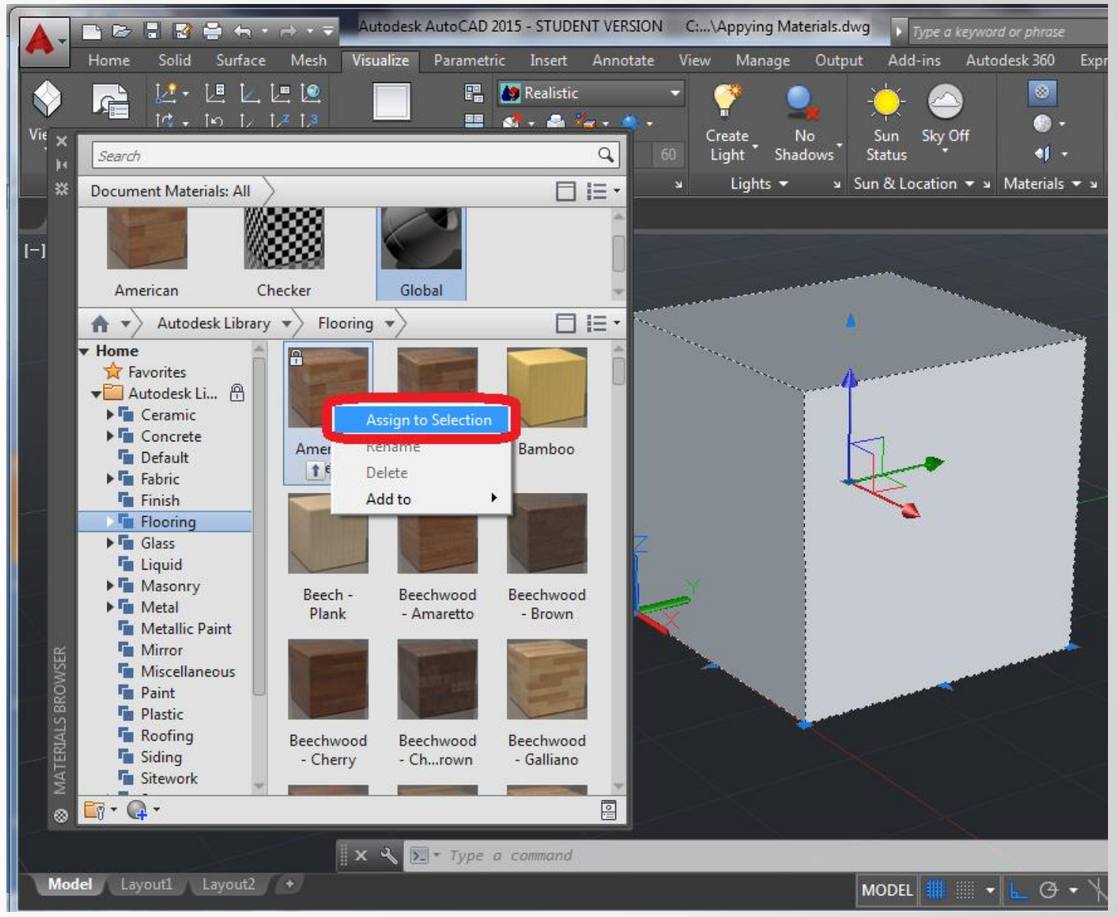


Libraries Area



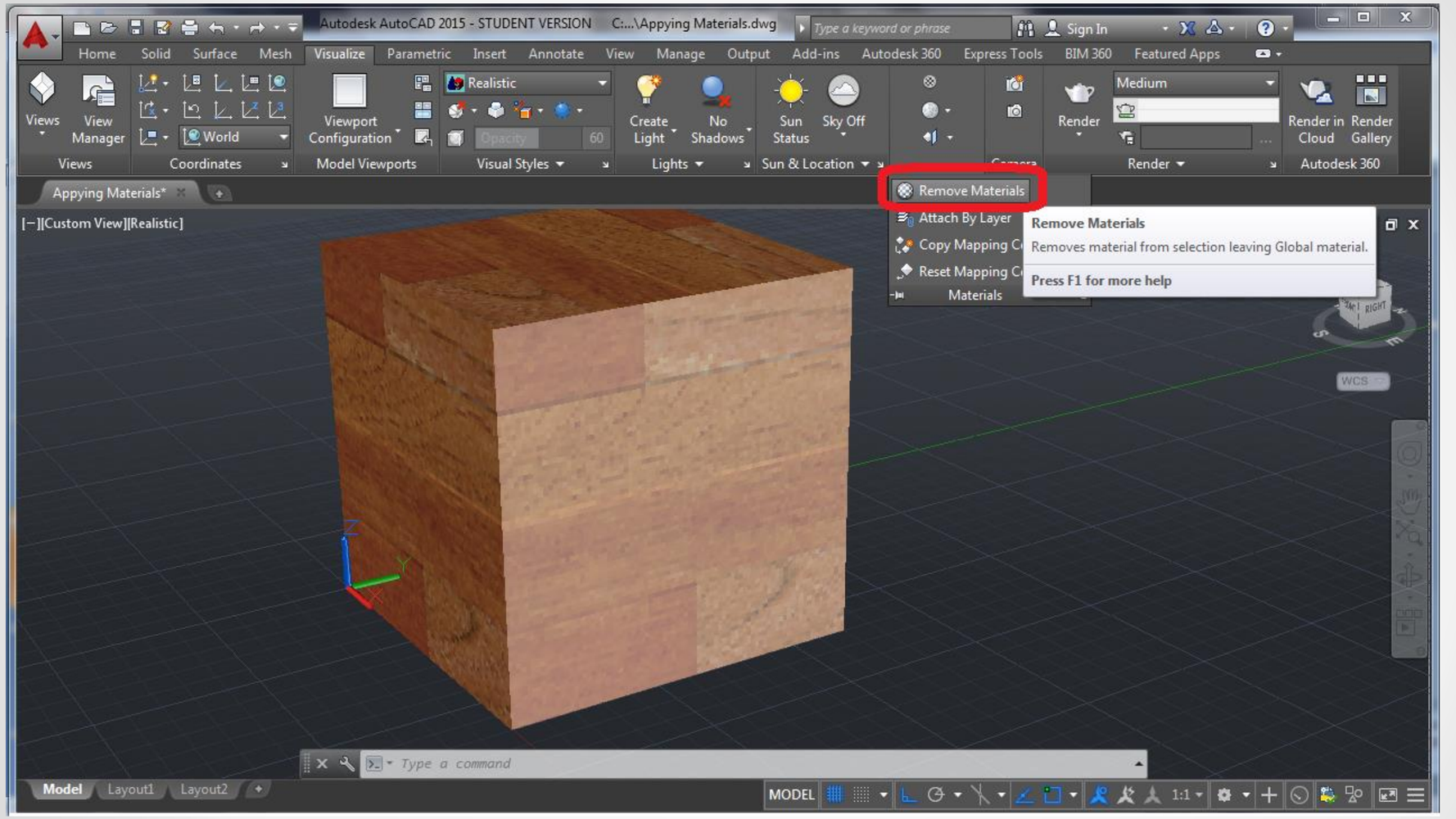
Applying Materials





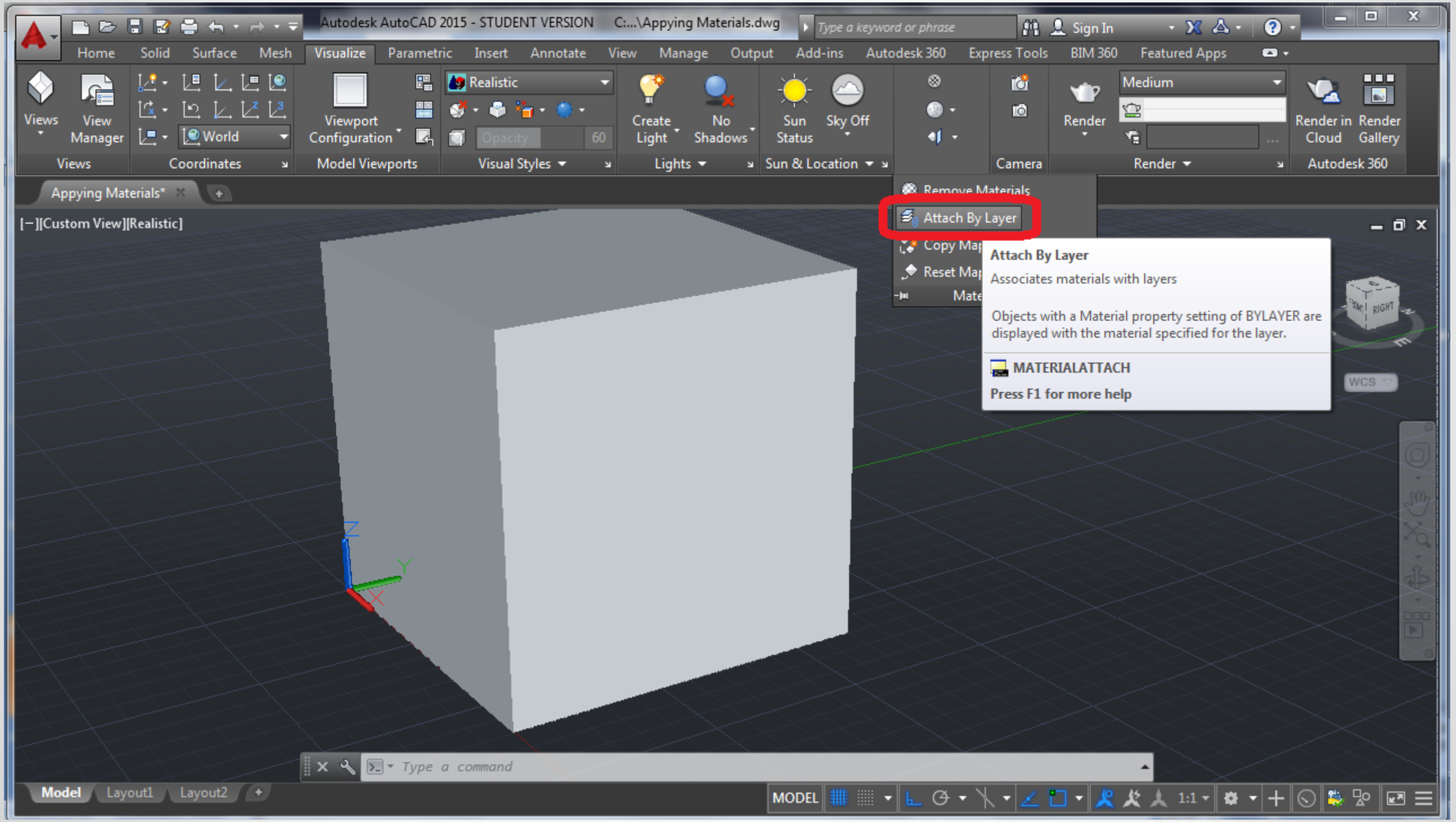
To apply a material to a face on an object, hold the [CTRL] key and pick the face.

Removing Materials

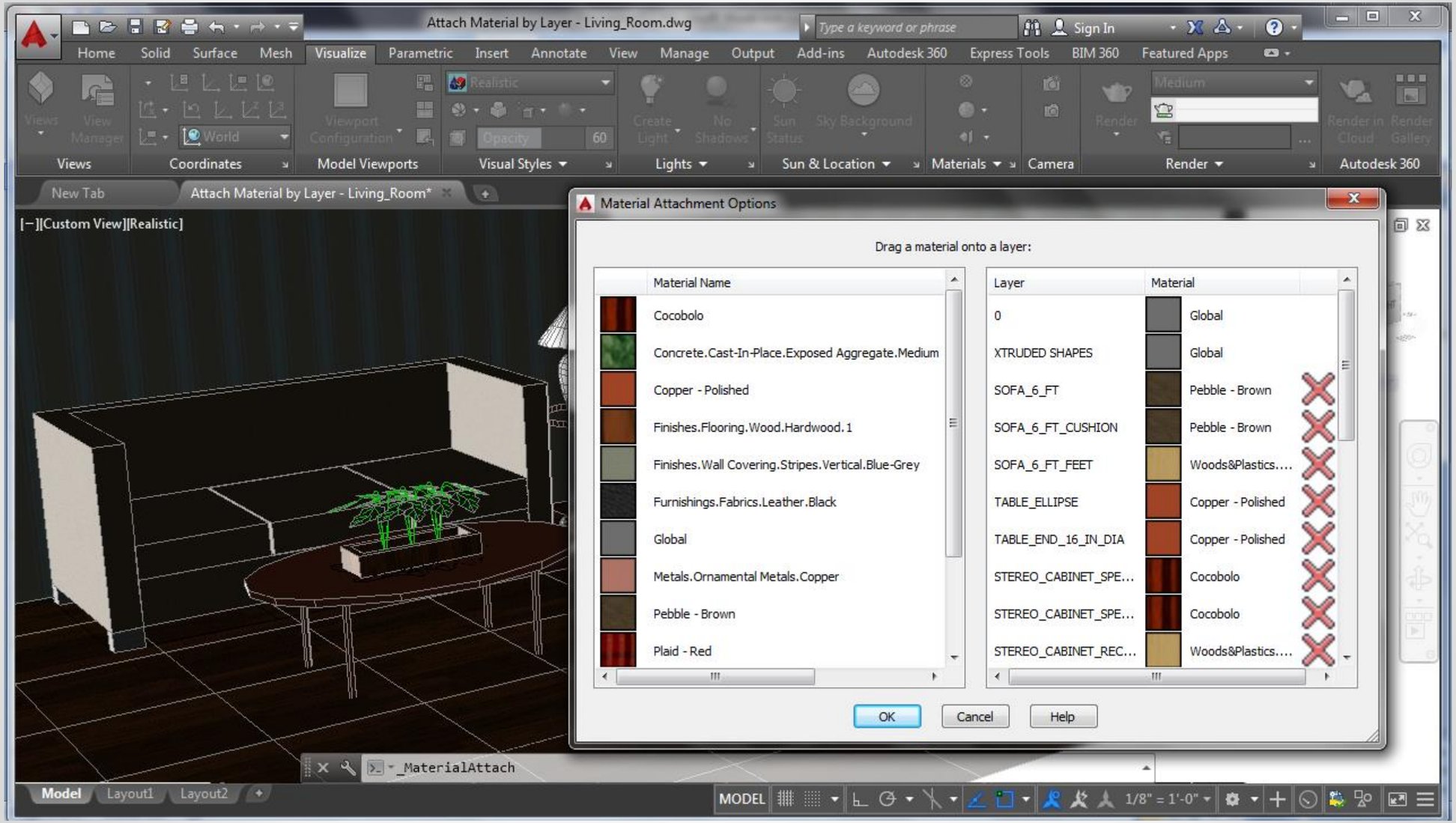


To remove a material from the face on an object, hold the [CTRL] key and pick the face.

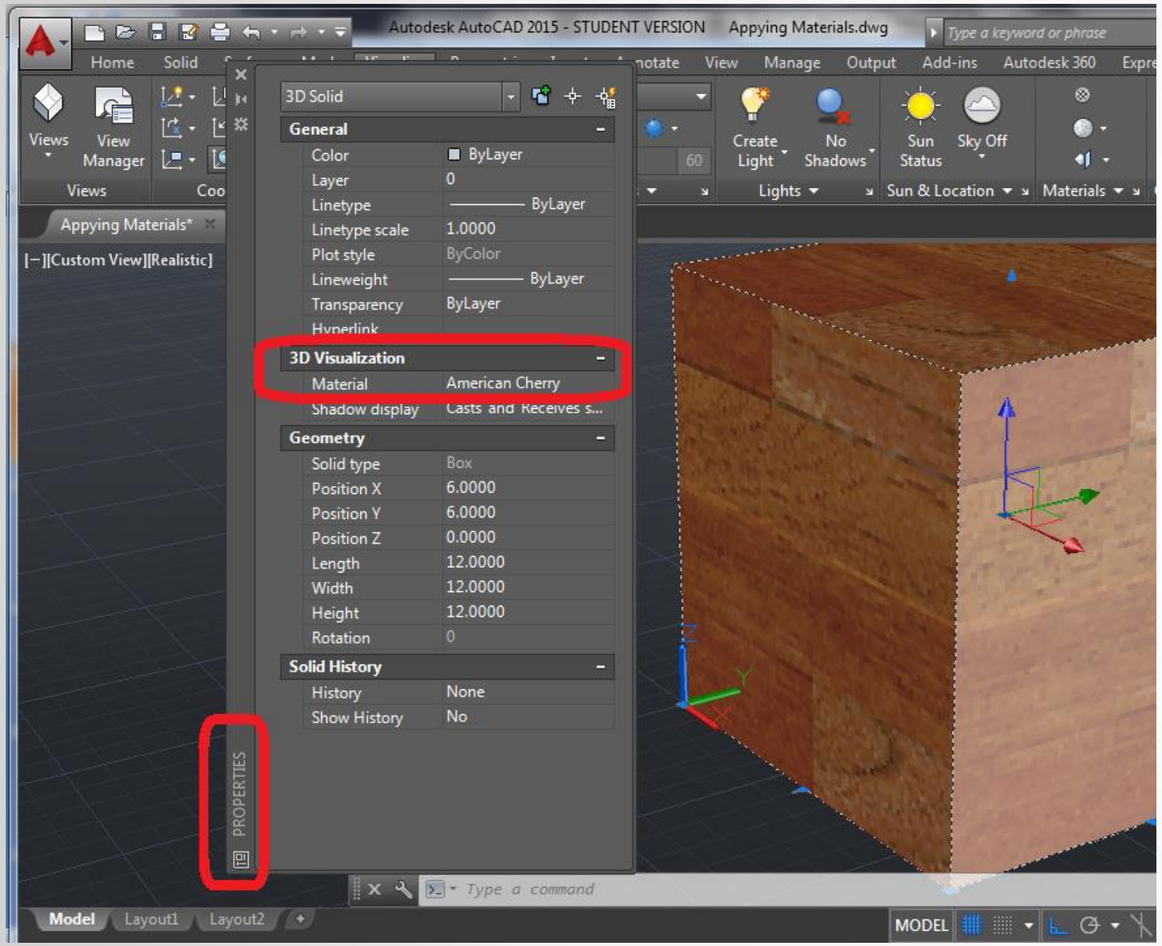
Attach Material by Layer

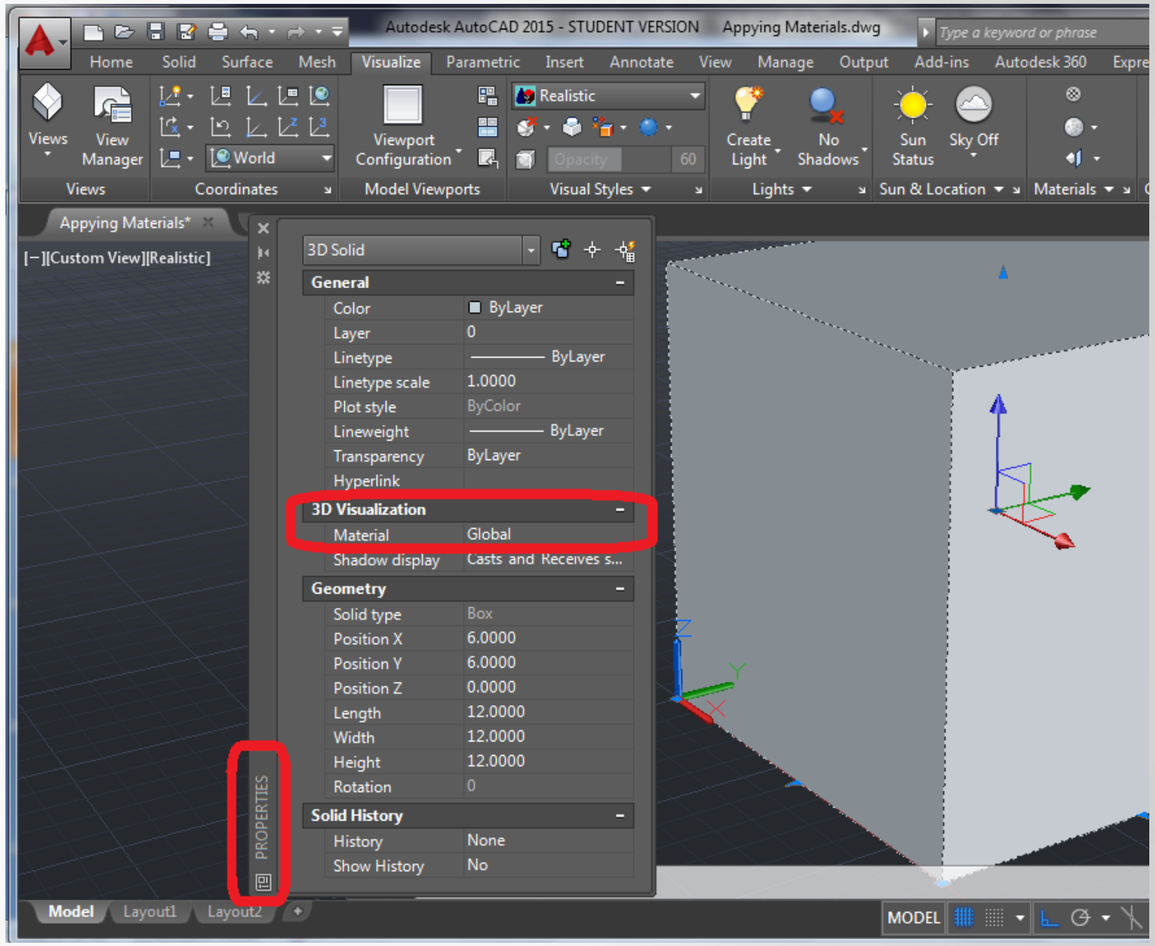


Attach Materials by Layer

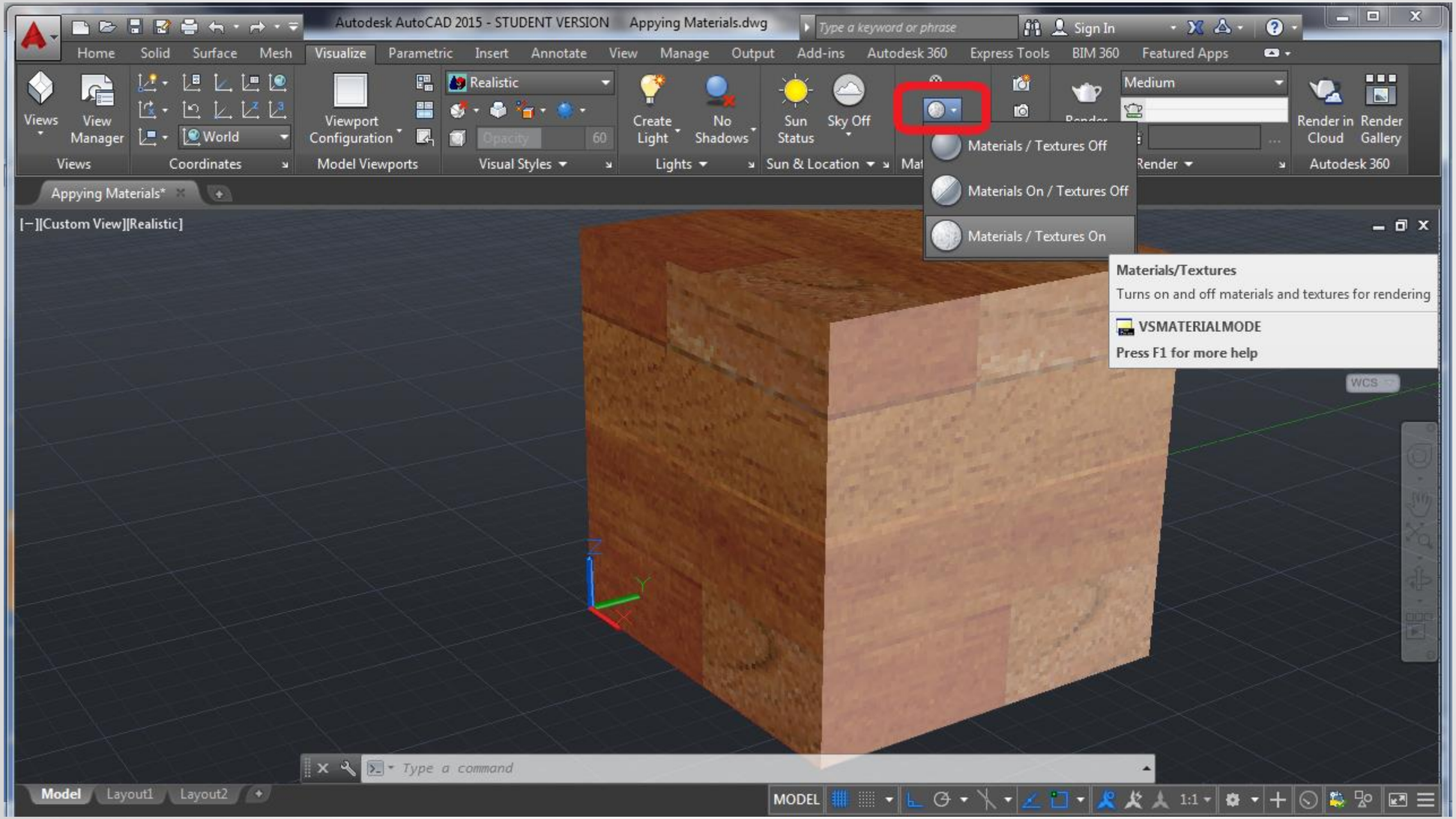


Material Assigned or Removed



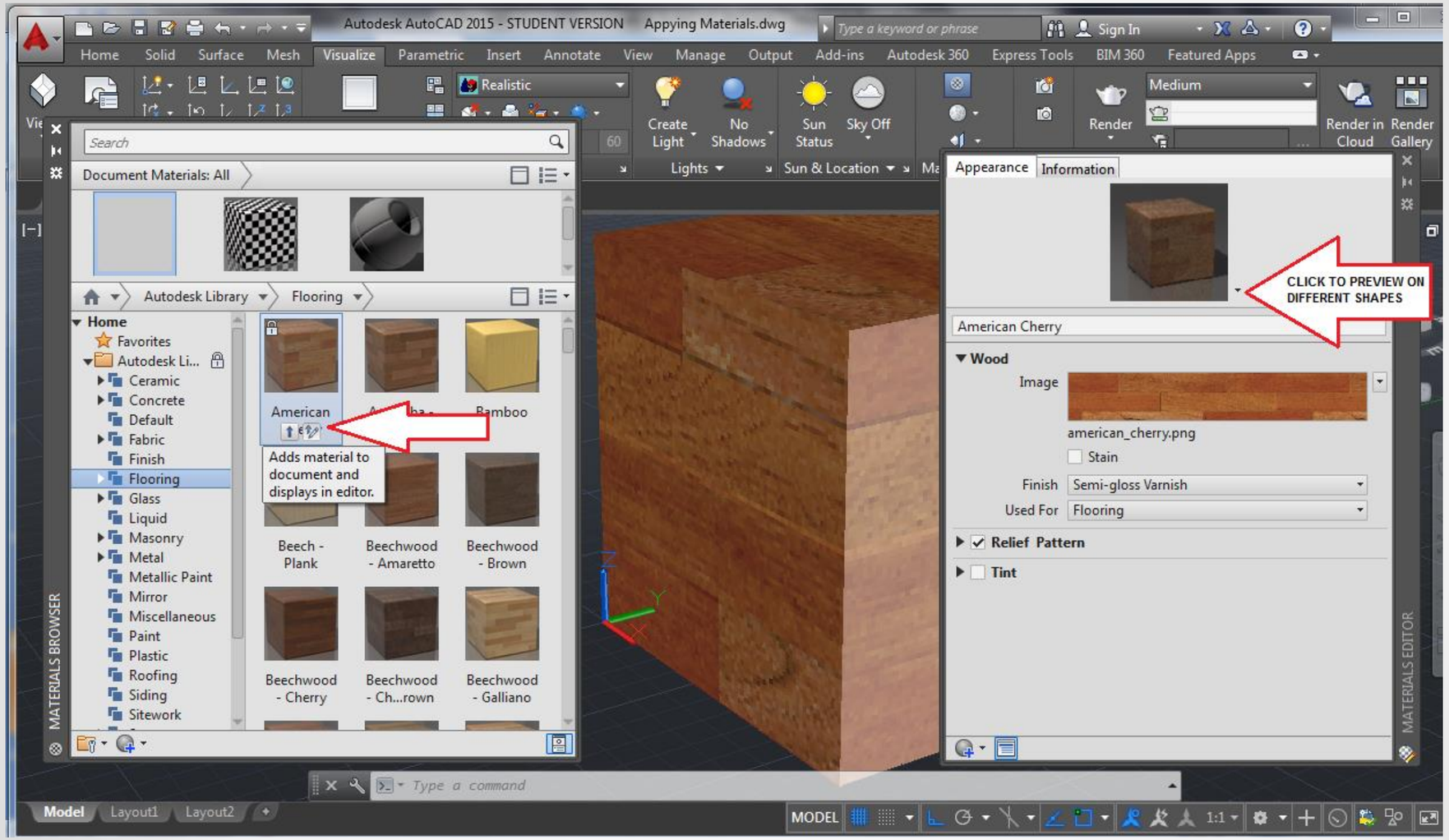


Material Display Options



Change the Properties of Existing Materials

Materials Editor



Double-click on a material swatch in the Document Materials area to display a small pencil icon. Picking this icon opens the materials editor.

Adjusting Materials Maps

Material Level Adjustments : Object Level Adjustments

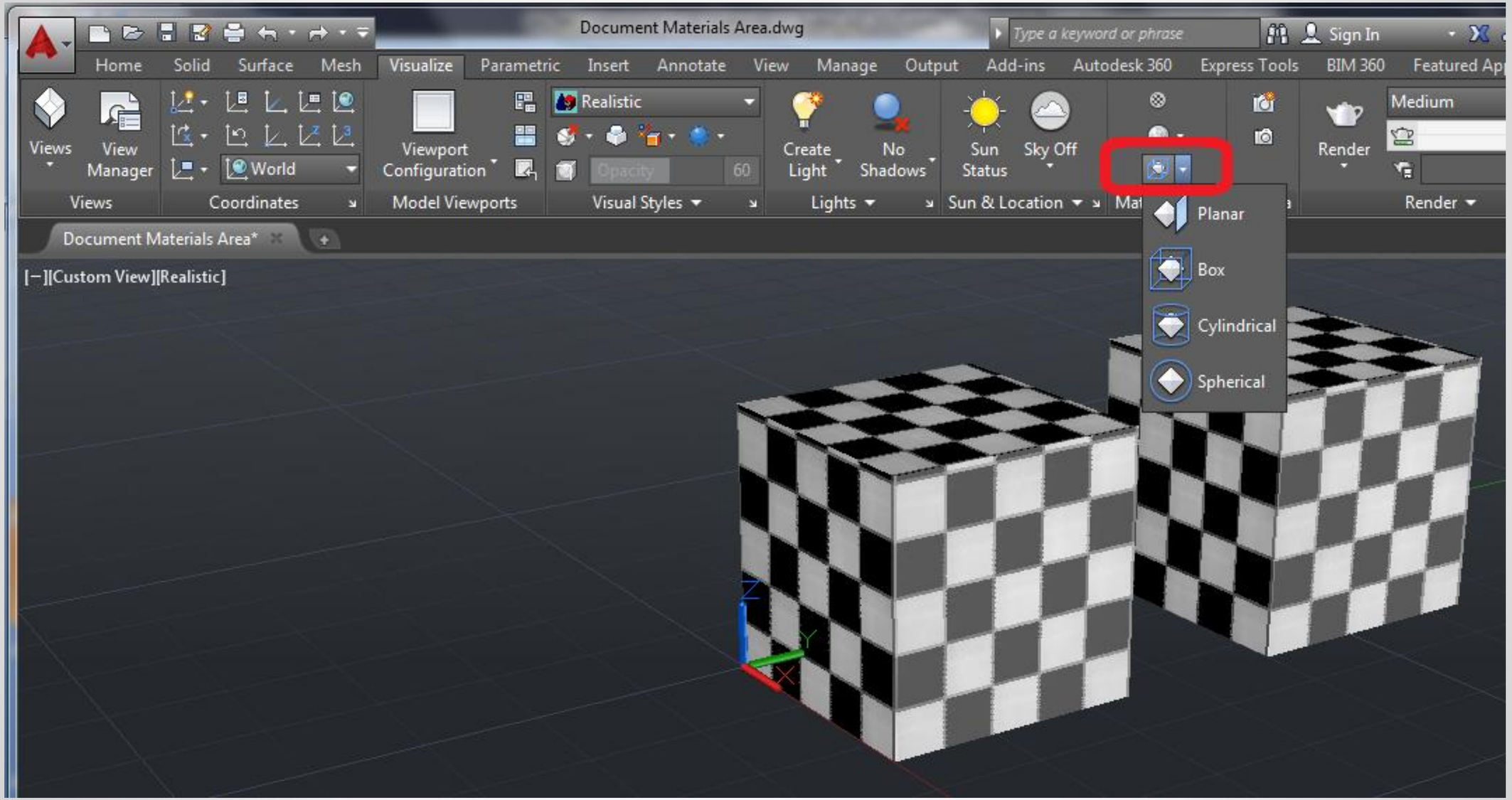
- Material-level adjustments involve changing the properties of the map in the material definition.

- If you make changes at the material level, they affect all objects with that same material.

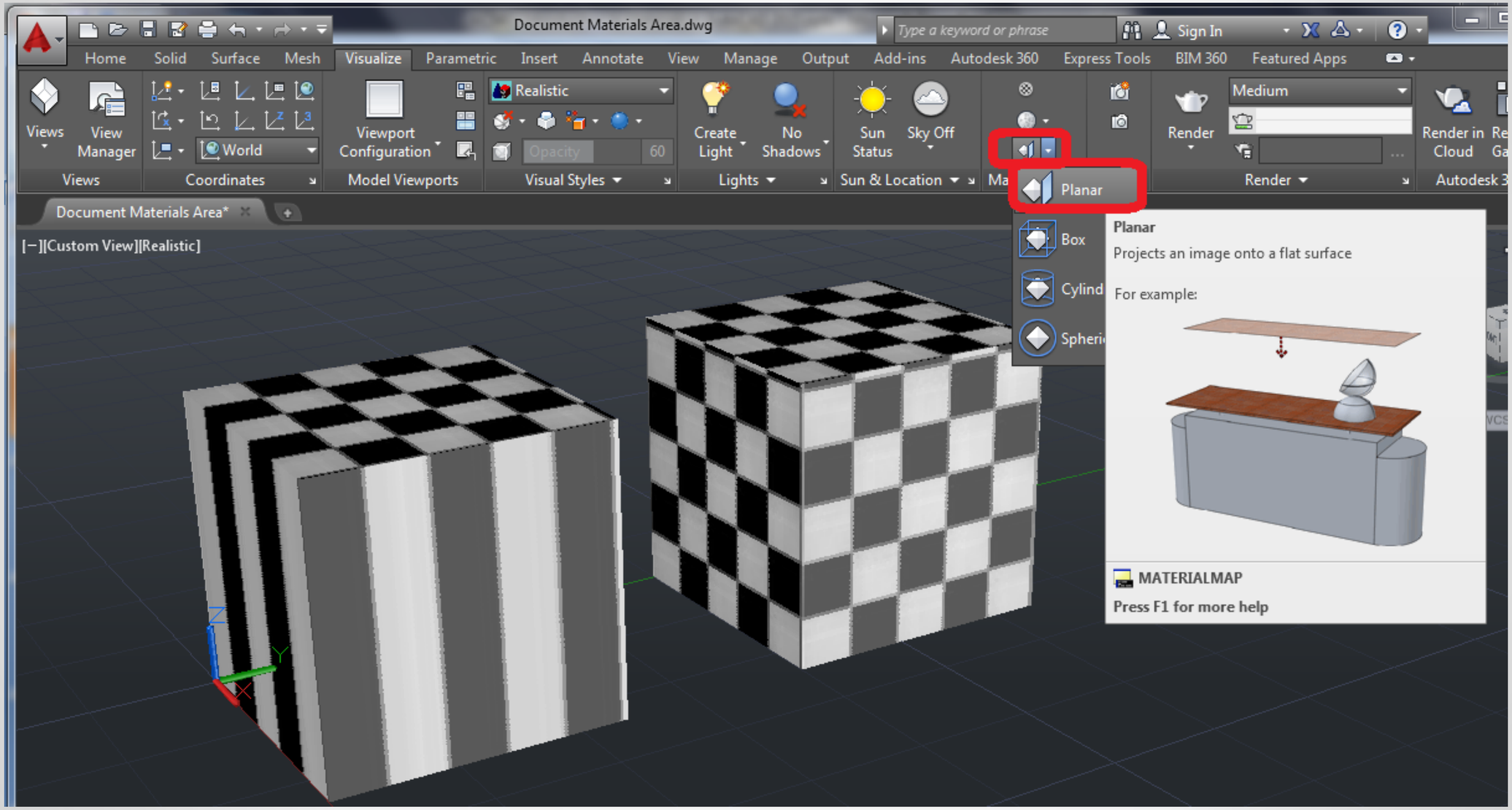
Material mapping refers to specifying how a mapped material is applied to an object.

When a mapped material is attached to an object, a default set of mapping coordinates, or simply *default mapping*, is used to apply the map to the object.

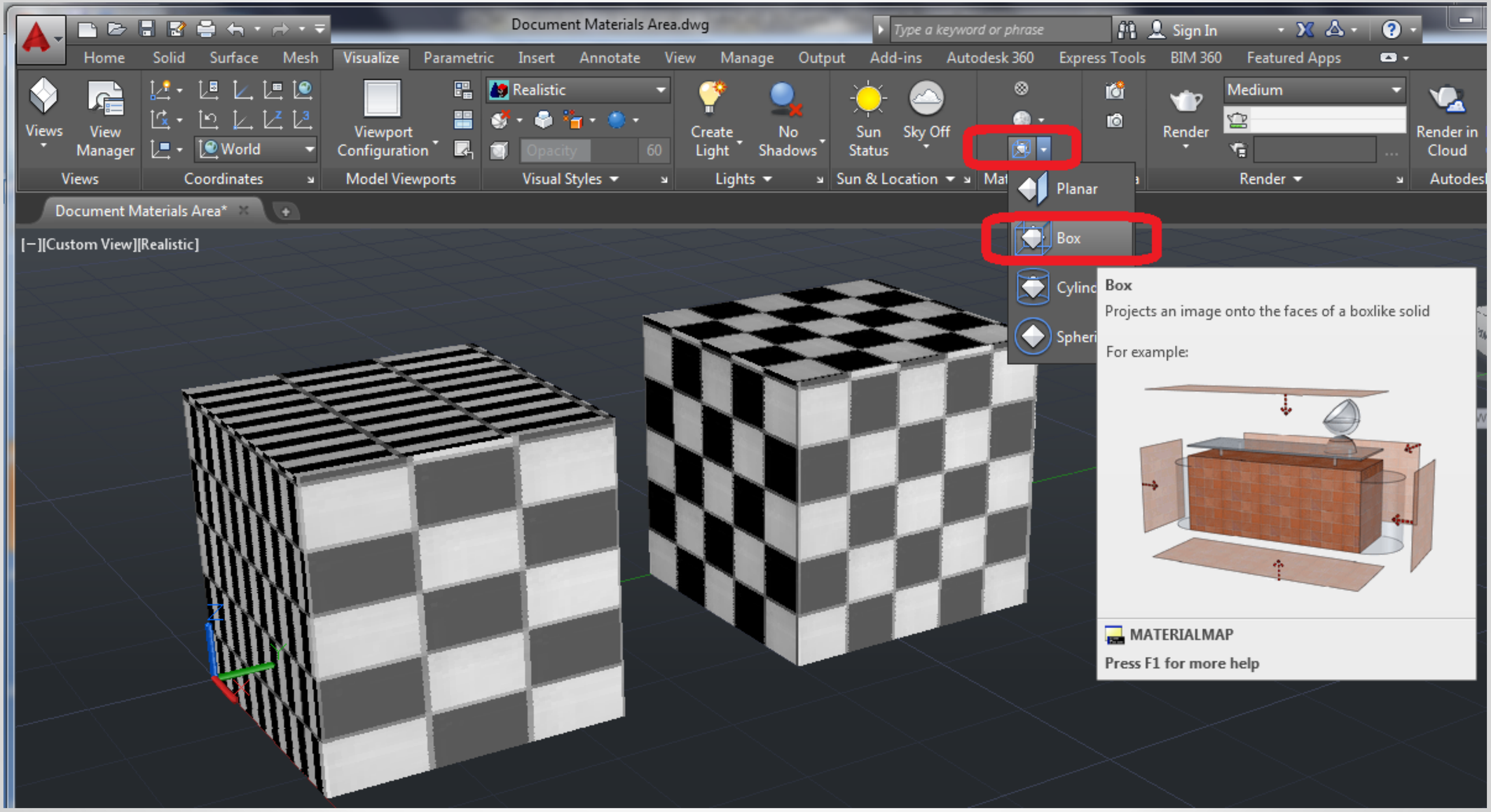
Object Level Adjustments



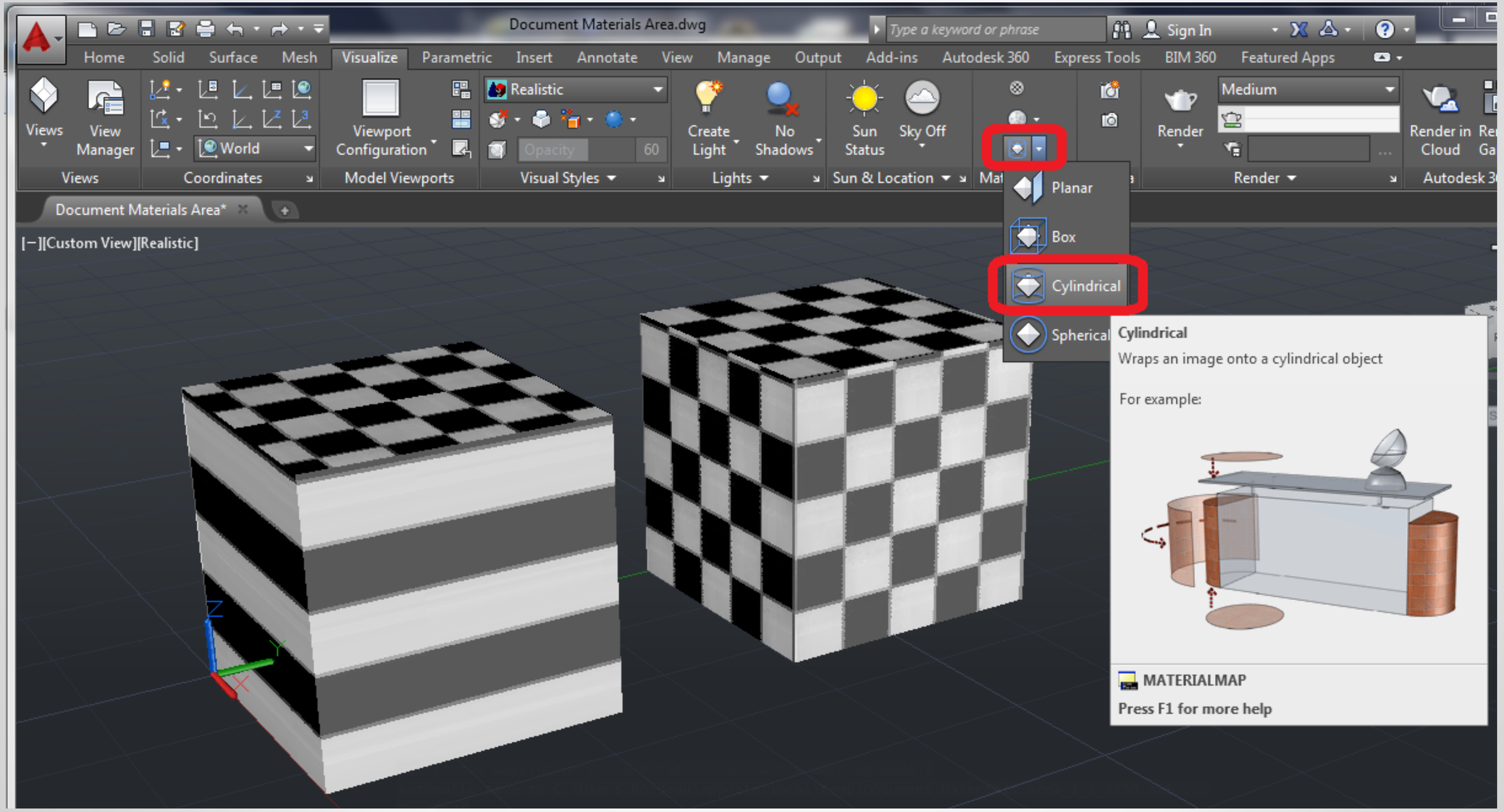
Object Level Adjustments - Planar Mapping



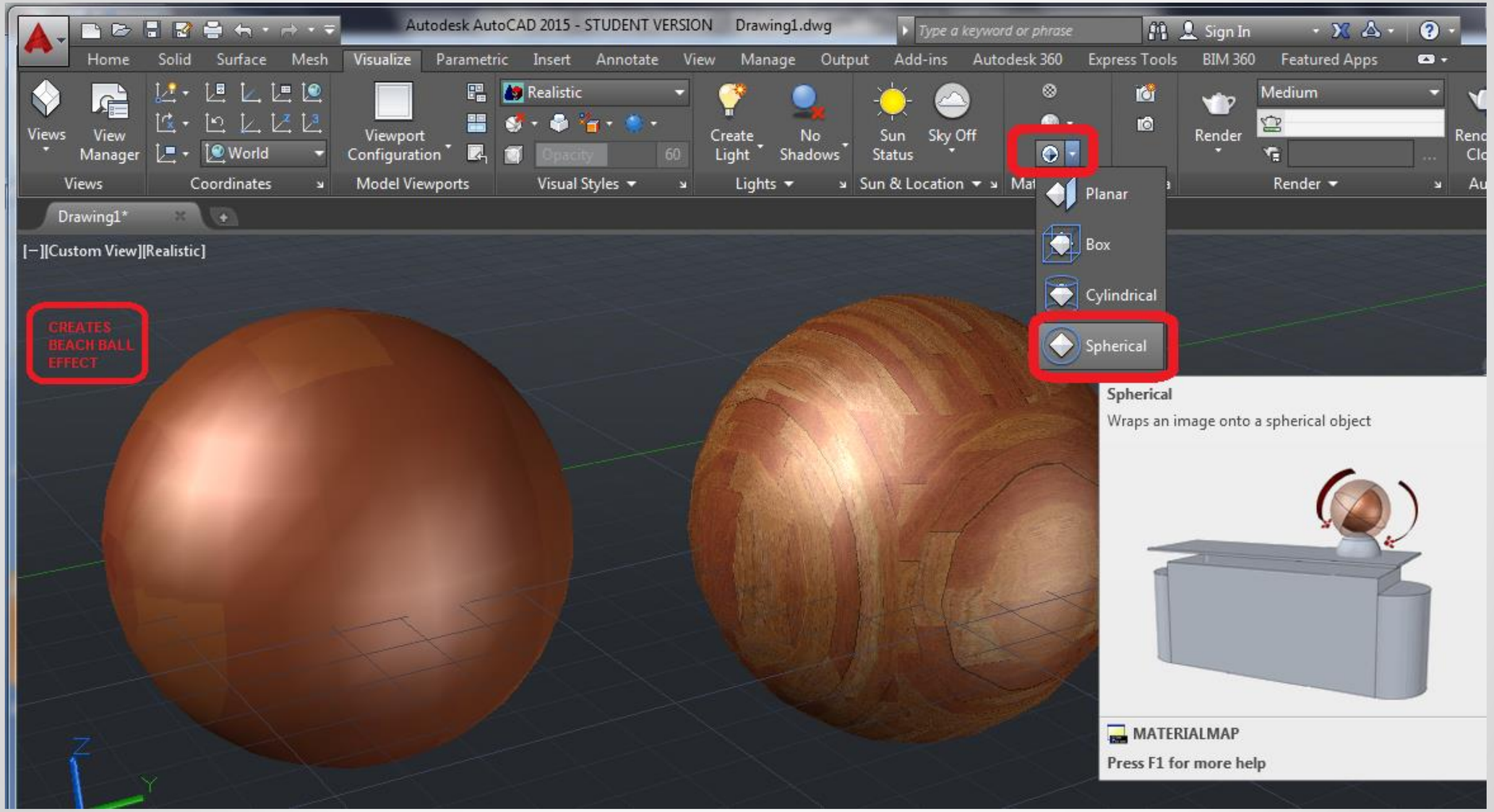
Object Level Adjustments - Box Mapping



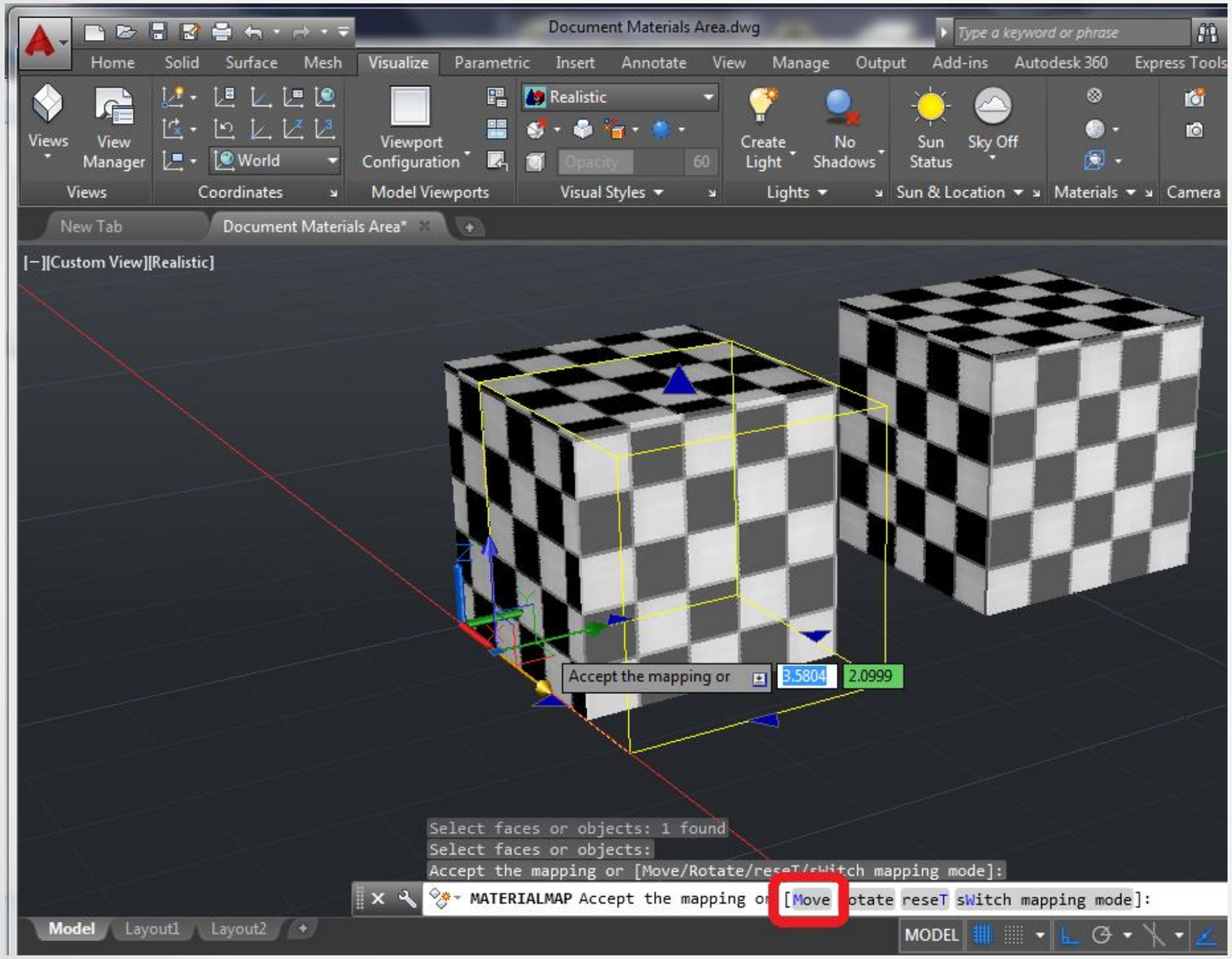
Object Level Adjustments - Cylindrical Mapping



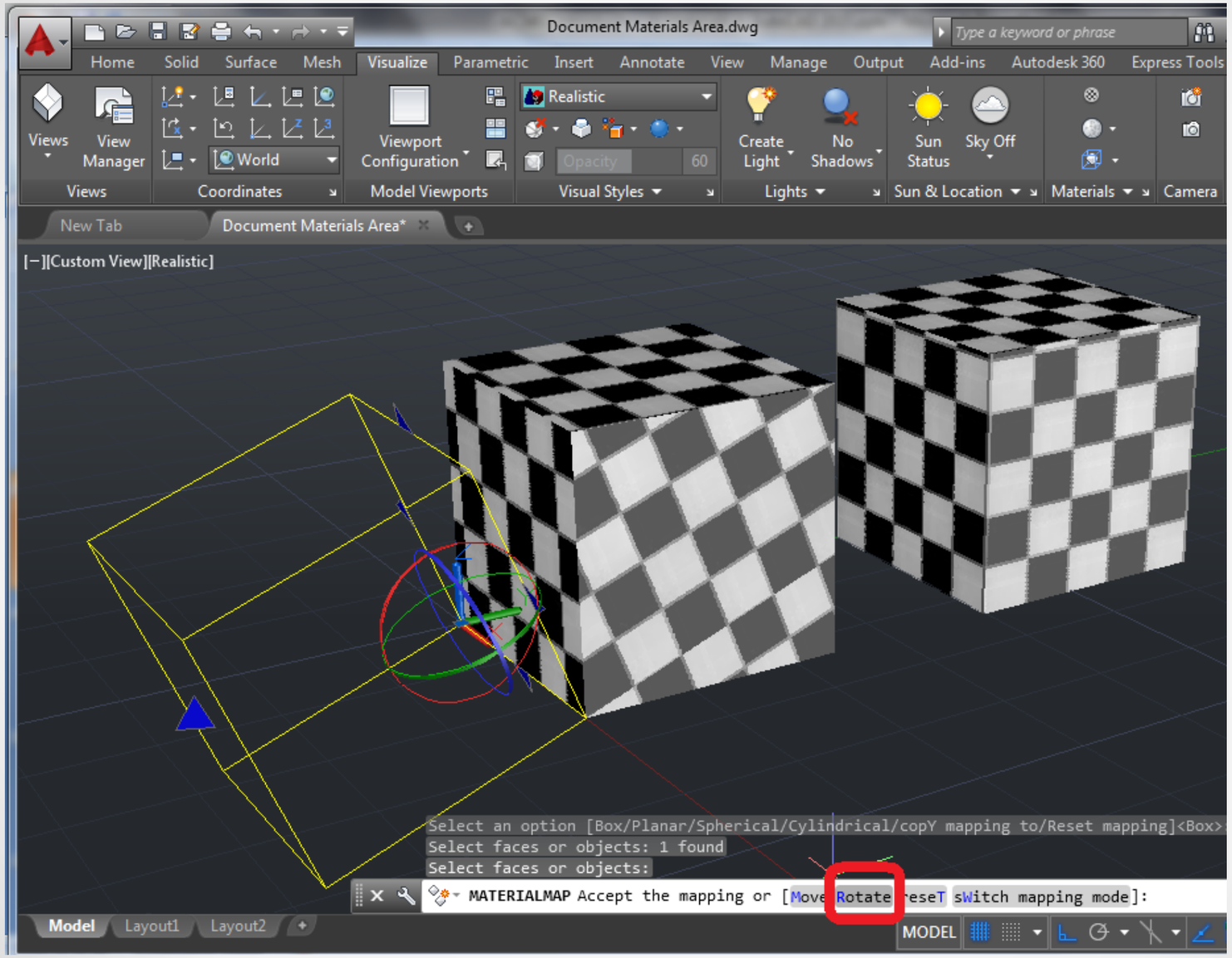
Object Level Adjustments - Spherical Mapping



Object-Level Adjustments - Move Gizmos



Object-Level Adjustments - Rotate Gizmo

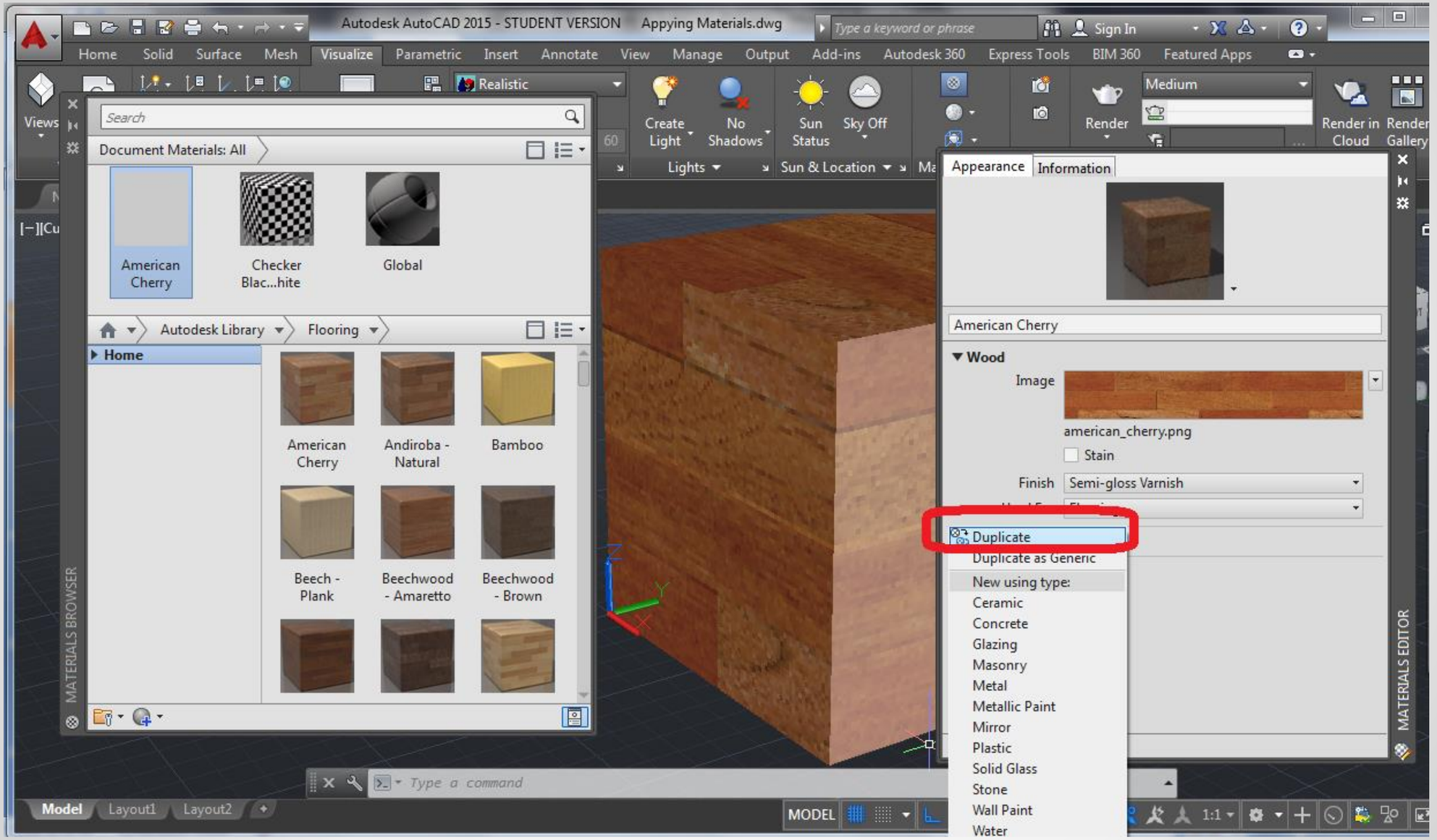


Break – Two Minutes

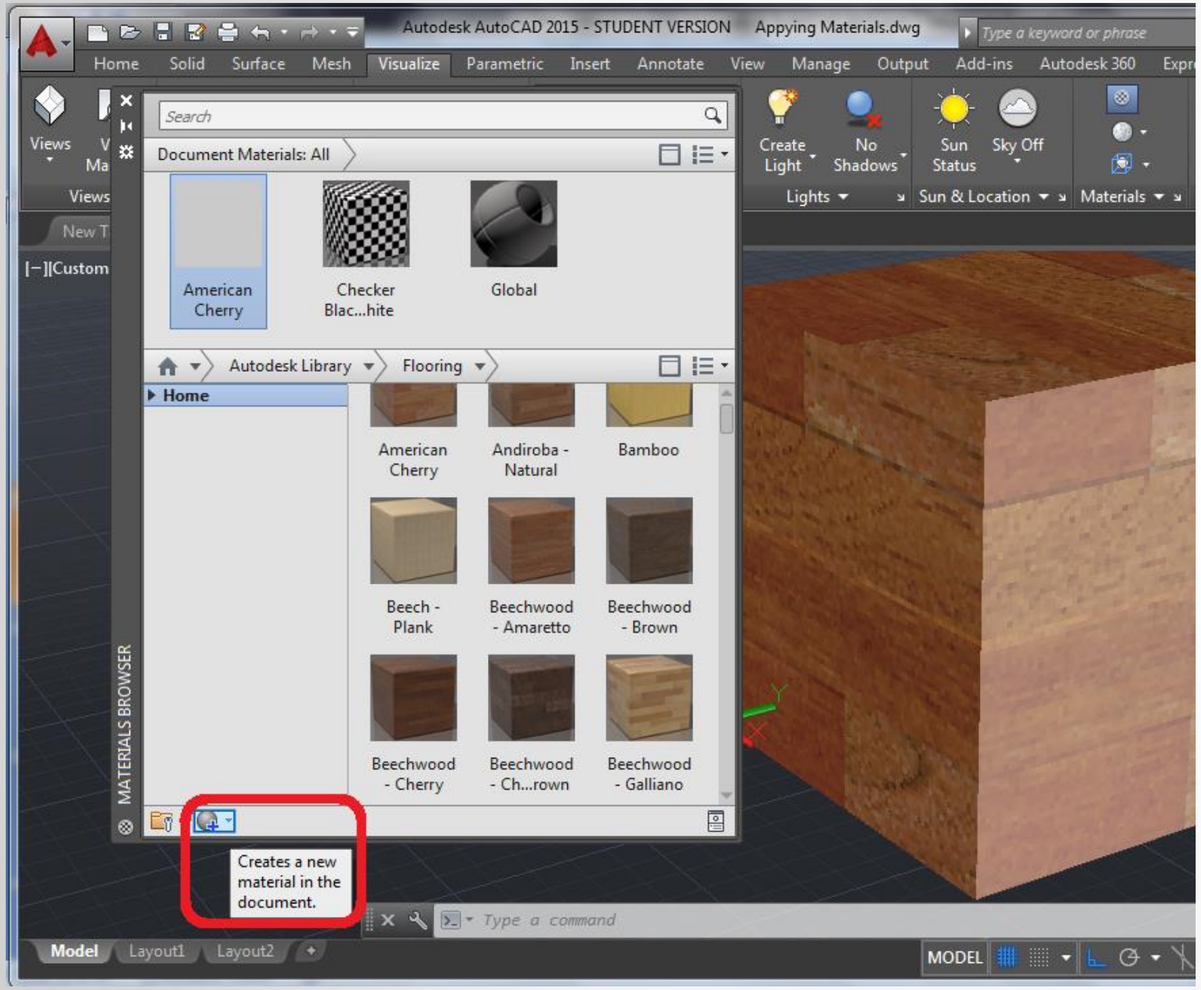
- Stand up and stretch
- Find two study buddies
- Pass a business card with Introduction to Materials in AutoCAD 2015 on the back of the card

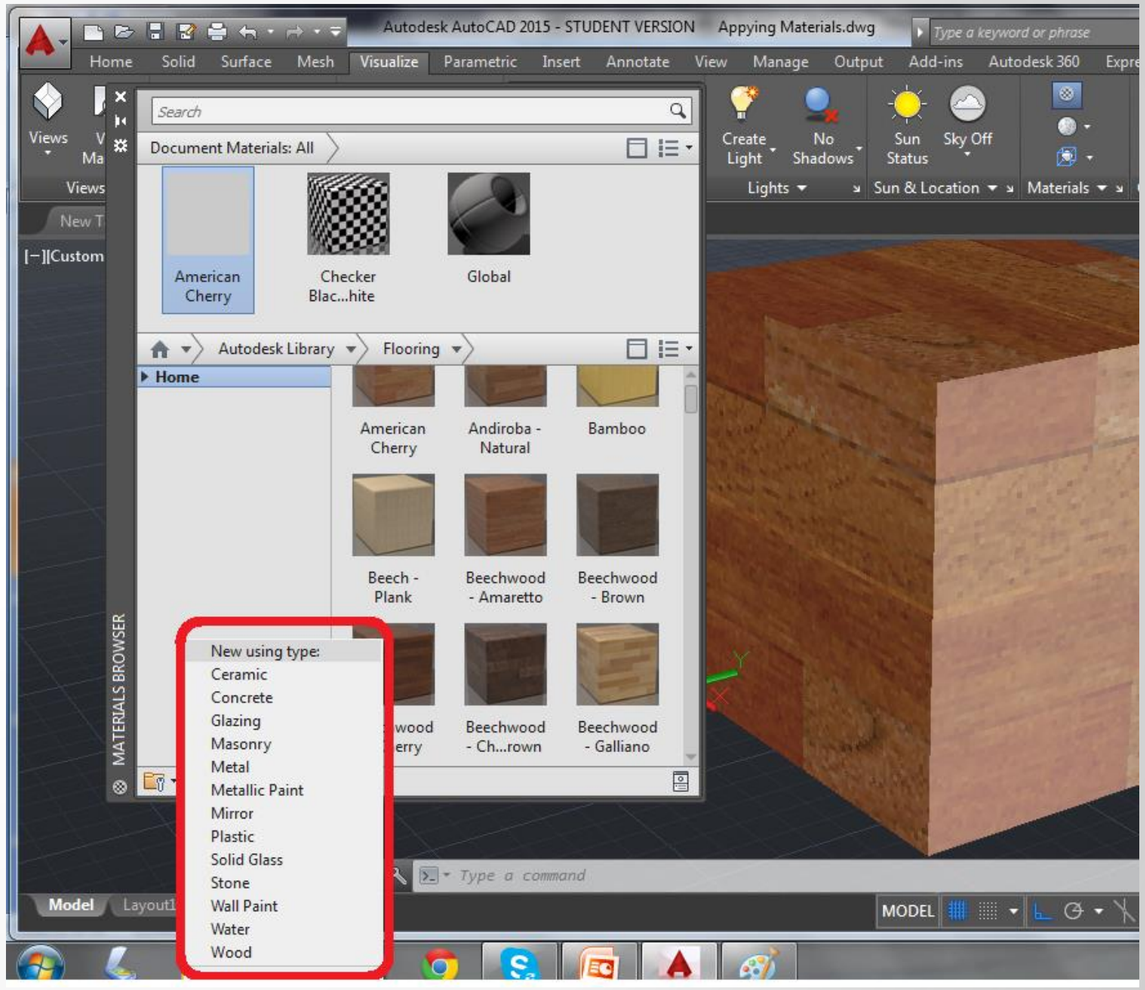
Create and Modify Materials

Create Material from an Existing Material



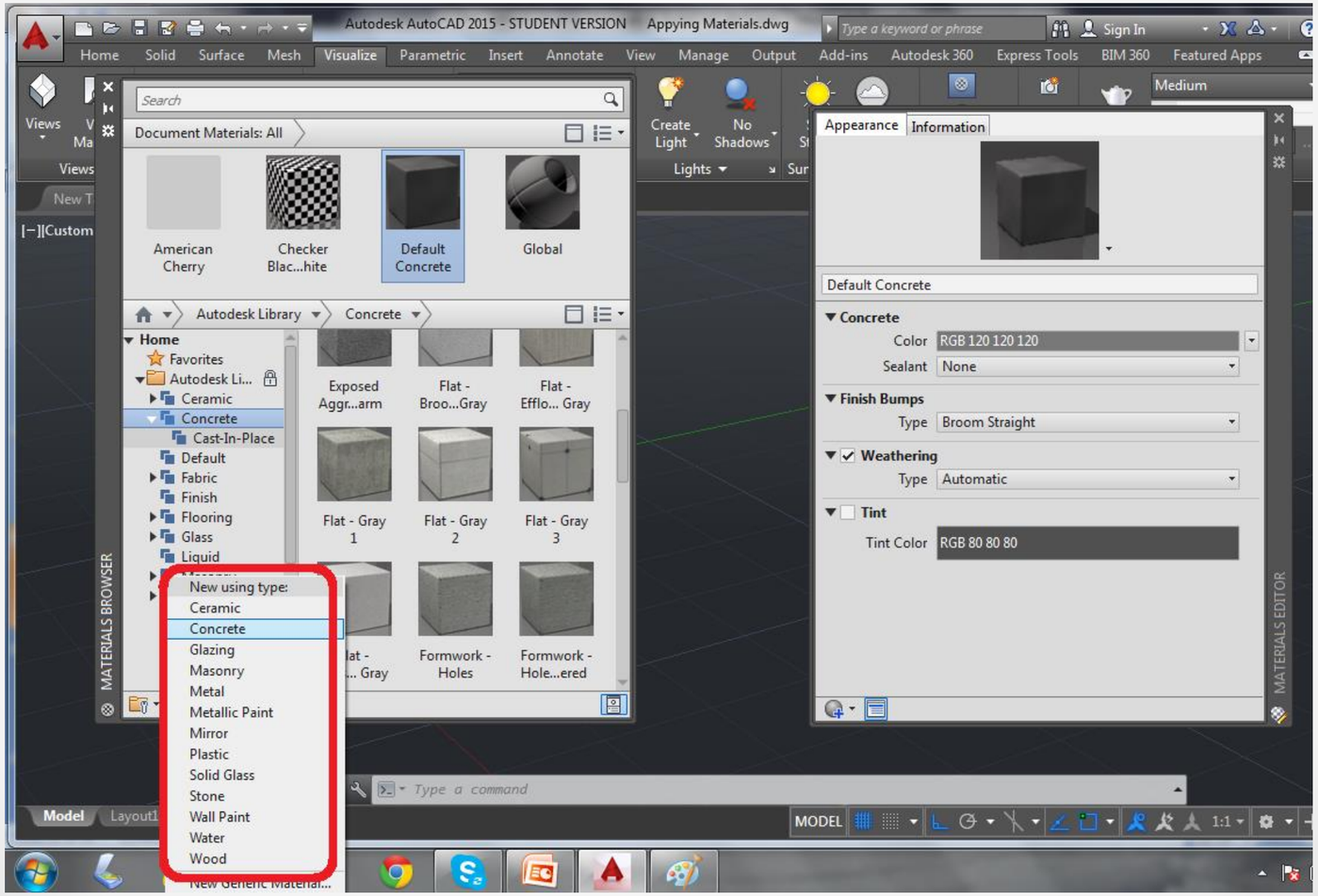
New Material Using an Existing Material Type





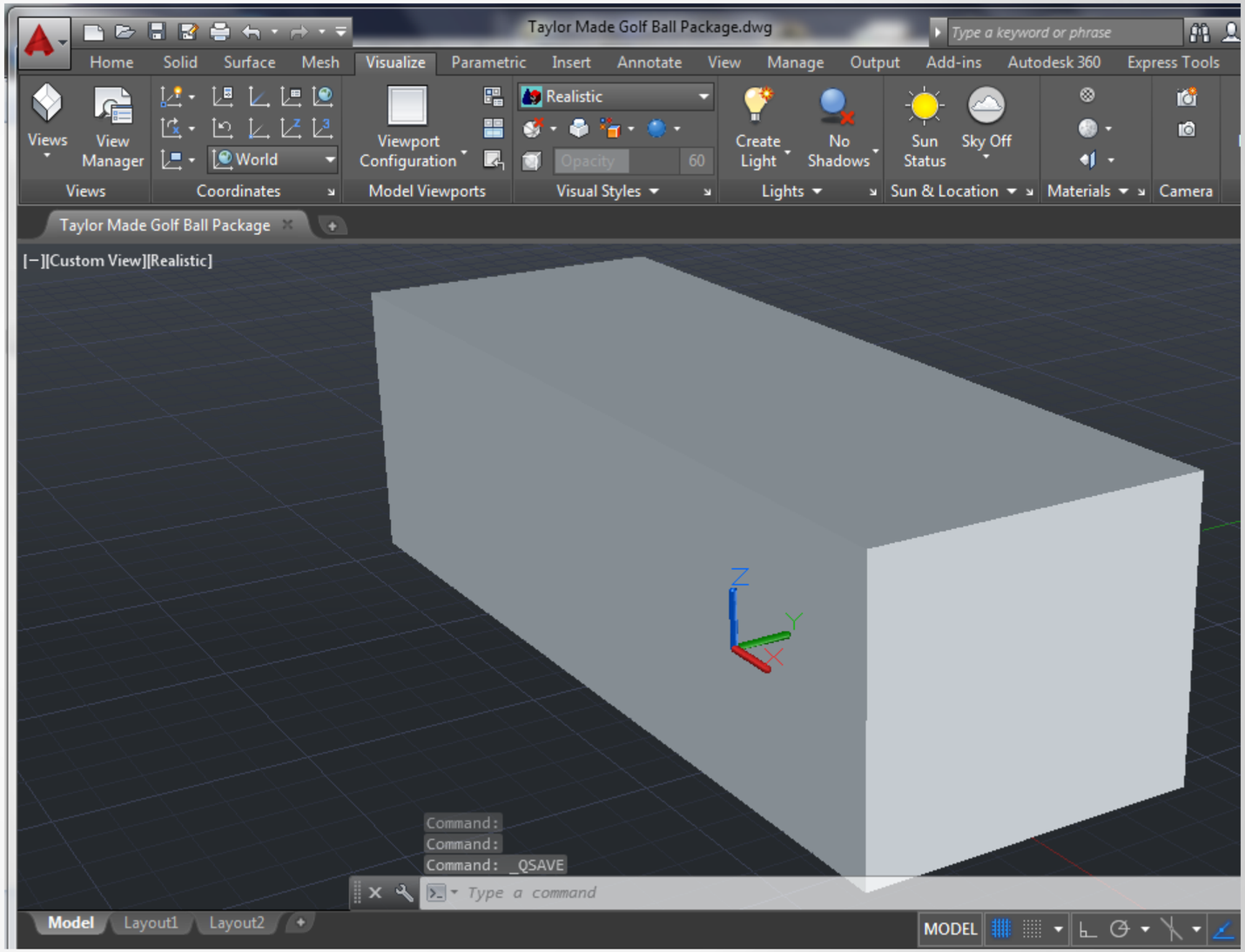
New Material Using an Existing Material Type:

Ceramic, Concrete, Glazing, Masonry, Metal, Metallic, Paint, Mirror, Plastic, Solid Glass, Stone, Wall Paint, Water and Wood



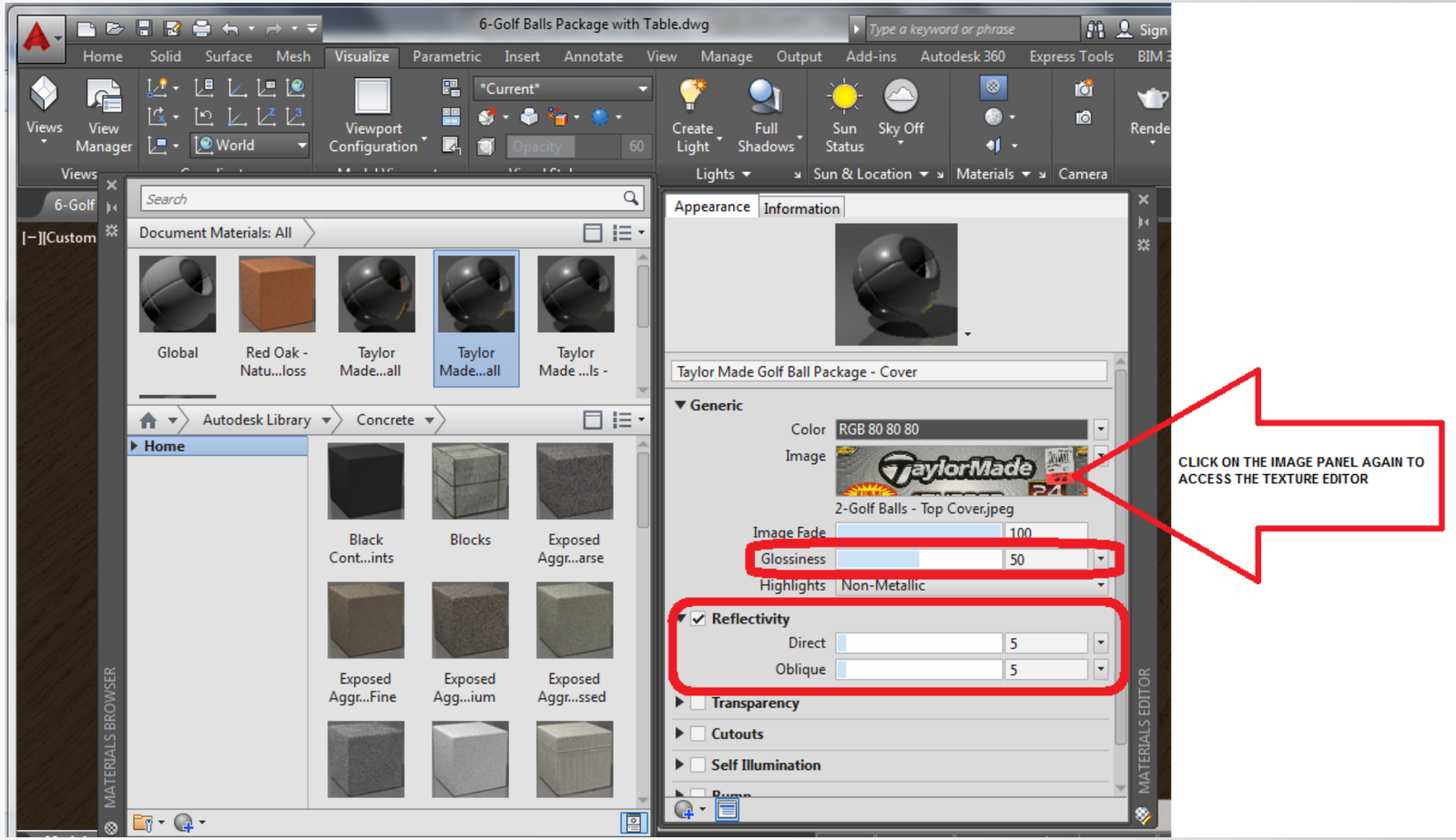
New Material from Scratch – Image Map

- Start a New Drawing
- Draw a Box 10.75” x 3.75” x 3.25”



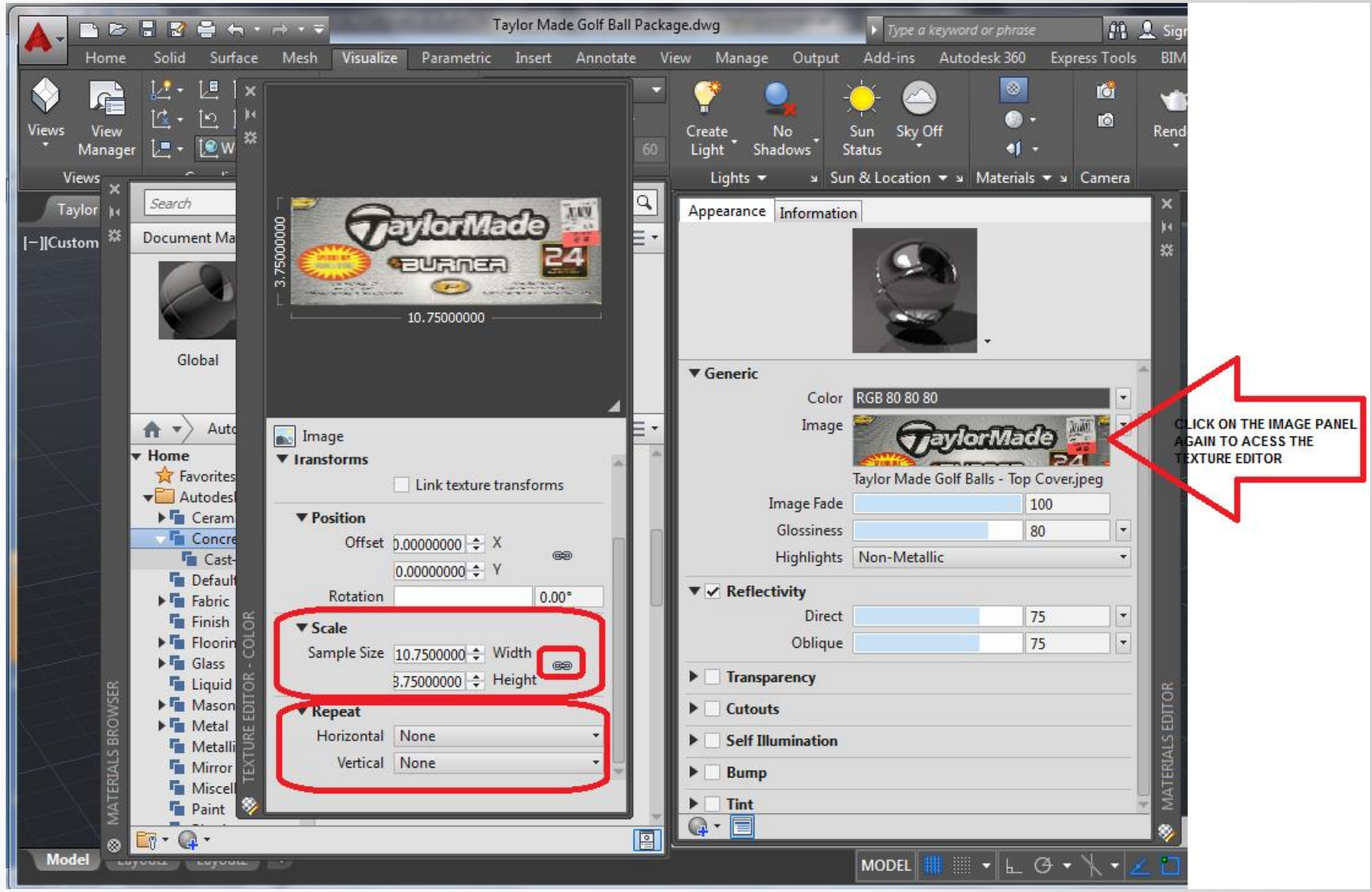
New Material from Scratch – Image Map

- Select Materials Browser
- Select New Generic Materials
- Name = Taylor Made Golf Ball Package Cover
- Pick on the Image panel
- Select Taylor Made Golf Balls - Top Cover.jpeg
- Set Glossiness to 50 and Reflectivity Direct and Oblique to 5



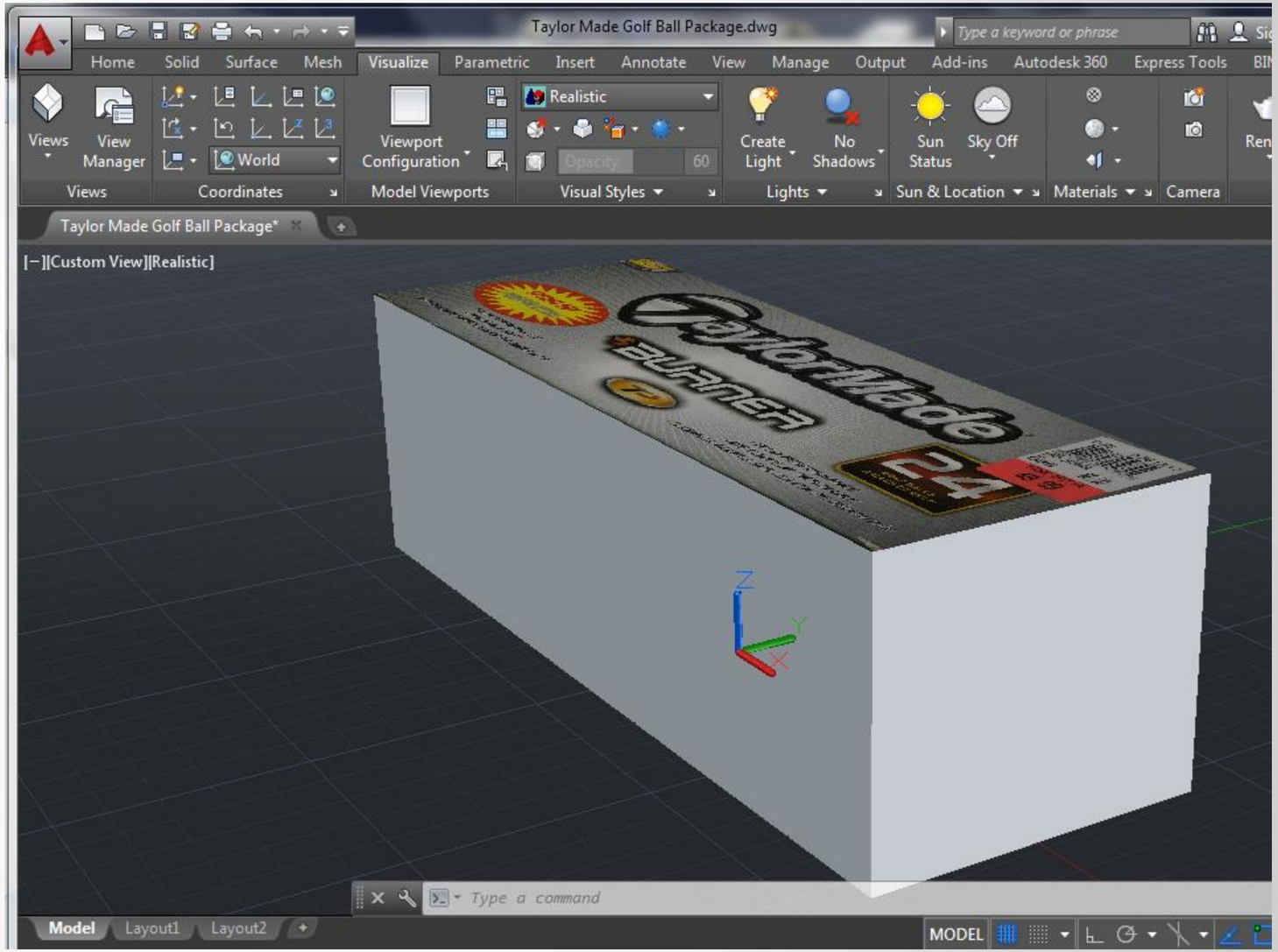
New Material from Scratch – Image Map

- Click on the Image panel
- Scale:
  - Un-click the link button
  - Width = 10.75
  - Height = 3.75
- Repeat:
  - Horizontal = None
  - Vertical = None

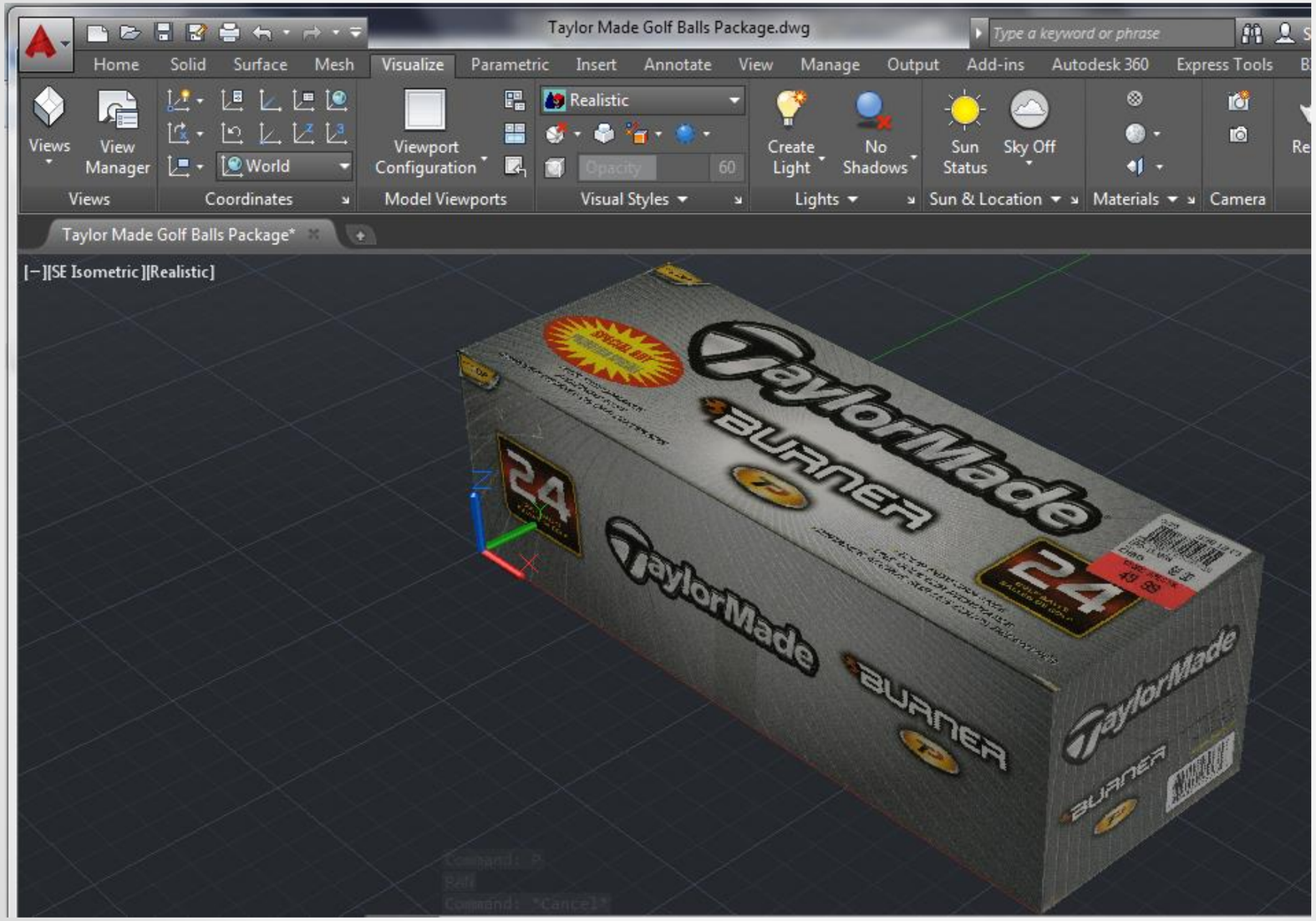


New Material from Scratch – Image Map

- Attach the New Material to the Top by Picking with CTLR
- Apply Object Level Adjustments - Planar Mapping
- Repeat steps for the Front and Back, Left and Right, and Bottom



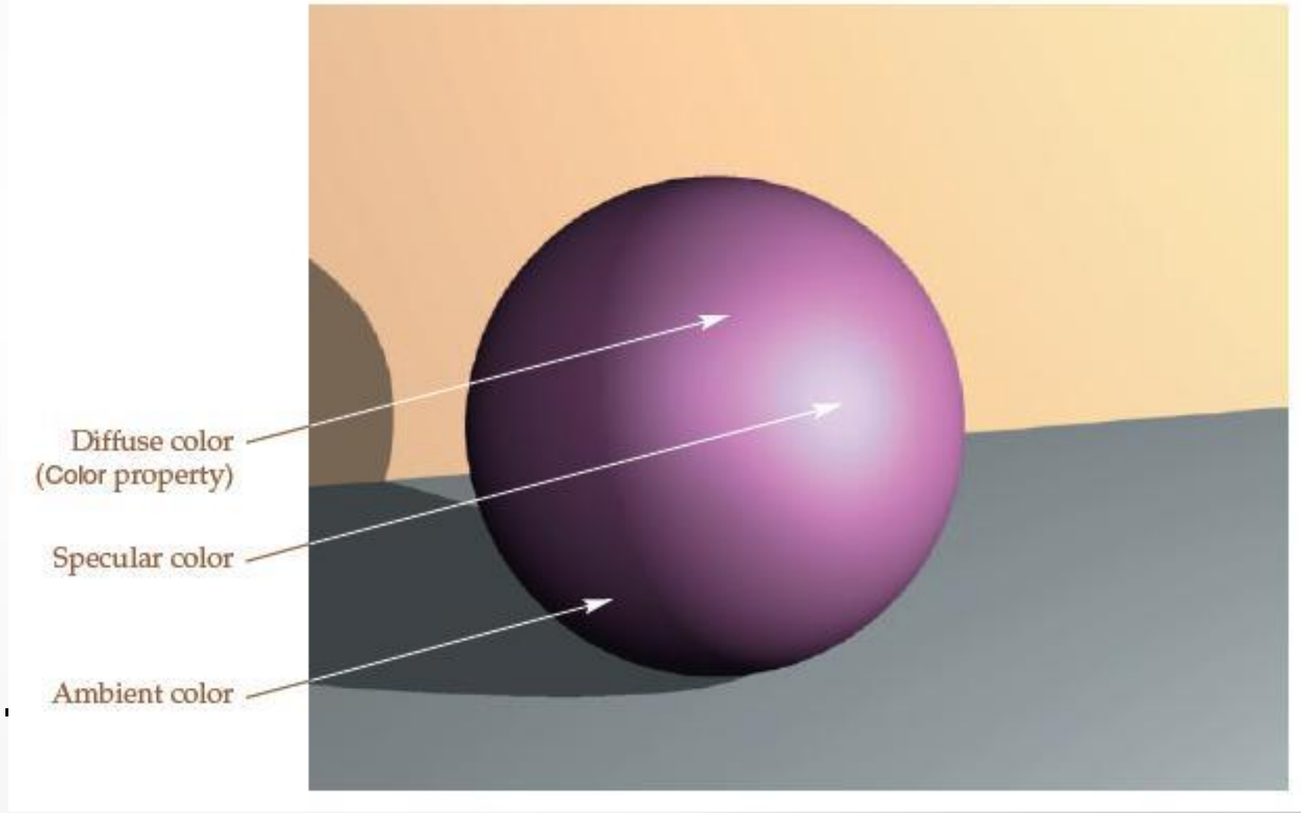
New Material from Scratch – Image Map



New Material from Scratch - Generic

- Diffuse color is the color of the object in lighted areas, or the perceived color of the material.
- The ambient color is the color of the object where light does not directly provide illumination
- The specular color is the color of the highlight (the shiny spot).

Figure 7.
The three colors of a material are illustrated here. In AutoCAD, the Color property sets the diffuse color. The ambient and specular colors are based on the diffuse color.



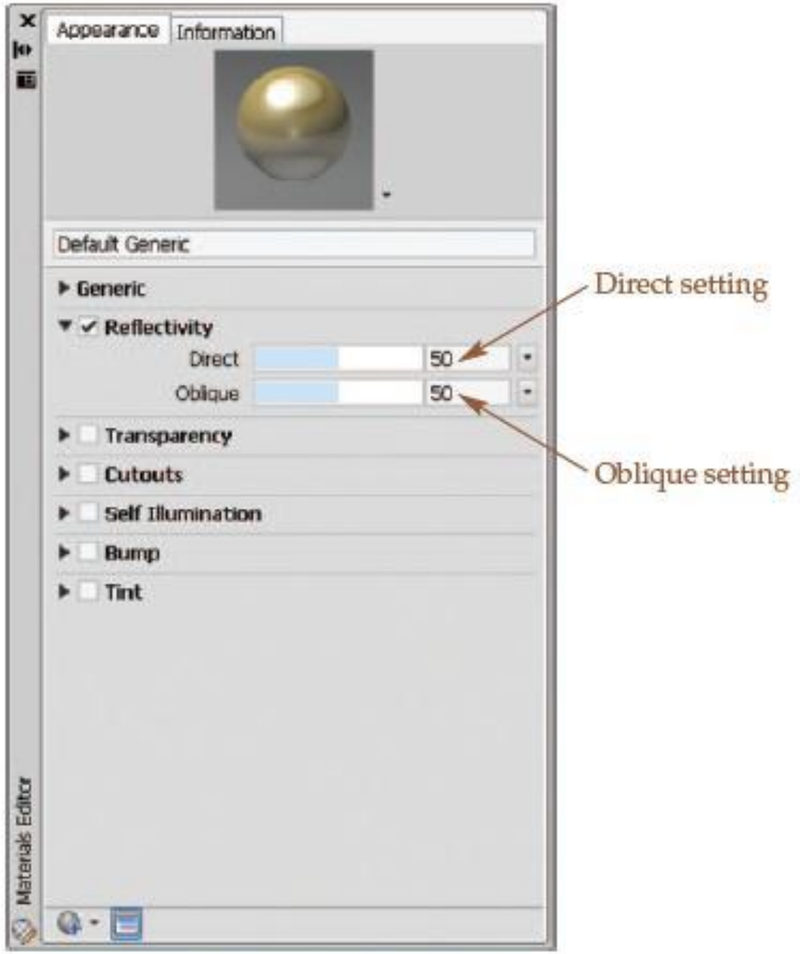
New Material from Scratch - Reflectivity

- Reflectivity is the measure of how much light is bounced off the surface.

- The Direct property controls how much light is reflected back for surfaces that are more or less facing the camera.

- The Oblique property controls how much light is reflected back when the surface is at an angle to the camera.

Figure 12. Setting the reflectivity for a material.



New Material from Scratch - Transparency

Figure 13.
The material used for the housing on this mechanism has a transparency setting of about 50.

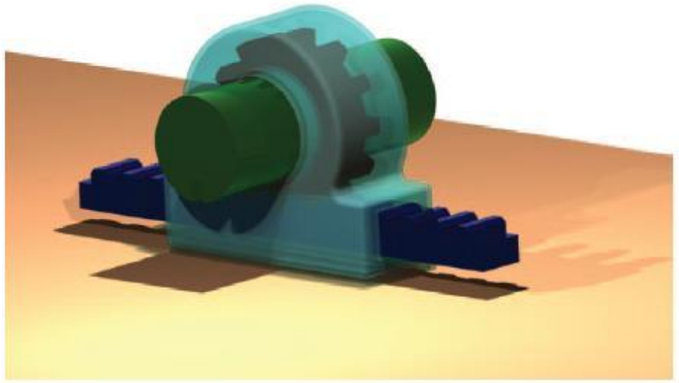


Figure 15.
The effect of translucency. A—The glass material has a translucency setting of zero. B—When the translucency setting is increased, light is diffused within the material. Notice how the glass appears slightly frosted.

A B

- Transparency is a measure of how much light the material allows to pass through it.
- Translucency is a quality of transparent and semitransparent materials that causes light to be diffused (scattered) as it passes through the material.

New Material from Scratch - Transparency

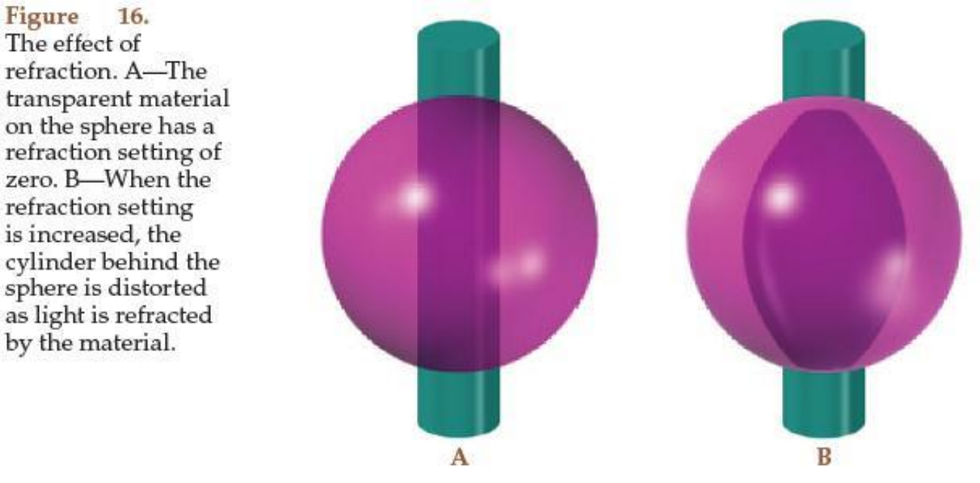


Figure 16. The effect of refraction. A—The transparent material on the sphere has a refraction setting of zero. B—When the refraction setting is increased, the cylinder behind the sphere is distorted as light is refracted by the material.

- The Index of Refraction (IOR) is a measure of how much light is bent (refracted) as it passes through a bottle or glass of water.

- Water = 1.3333
- Ice = 1.3100
- Acrylic glass = 1.491
- Beer = 1.345

New Material from Scratch - Cutouts

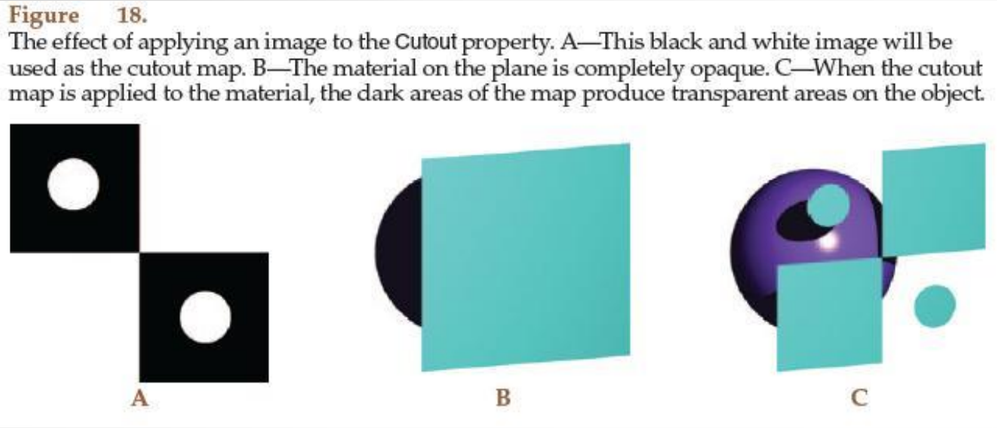


Figure 18.
The effect of applying an image to the Cutout property. A—This black and white image will be used as the cutout map. B—The material on the plane is completely opaque. C—When the cutout map is applied to the material, the dark areas of the map produce transparent areas on the object.

- The Cutouts property allows you to select an image or texture to use for a pattern of cutouts (holes).
- Black areas in the image will appear to be see-through, as if there is object in those areas.
- White areas in the image have the normal material colors.

New Material from Scratch – Self Illumination

Figure 19.
The effect of self illumination/luminance. A—The globe of this light bulb does not have any self illumination. B—Self illumination is applied to the globe material.

- Self Illumination is an effect of a material producing illumination.

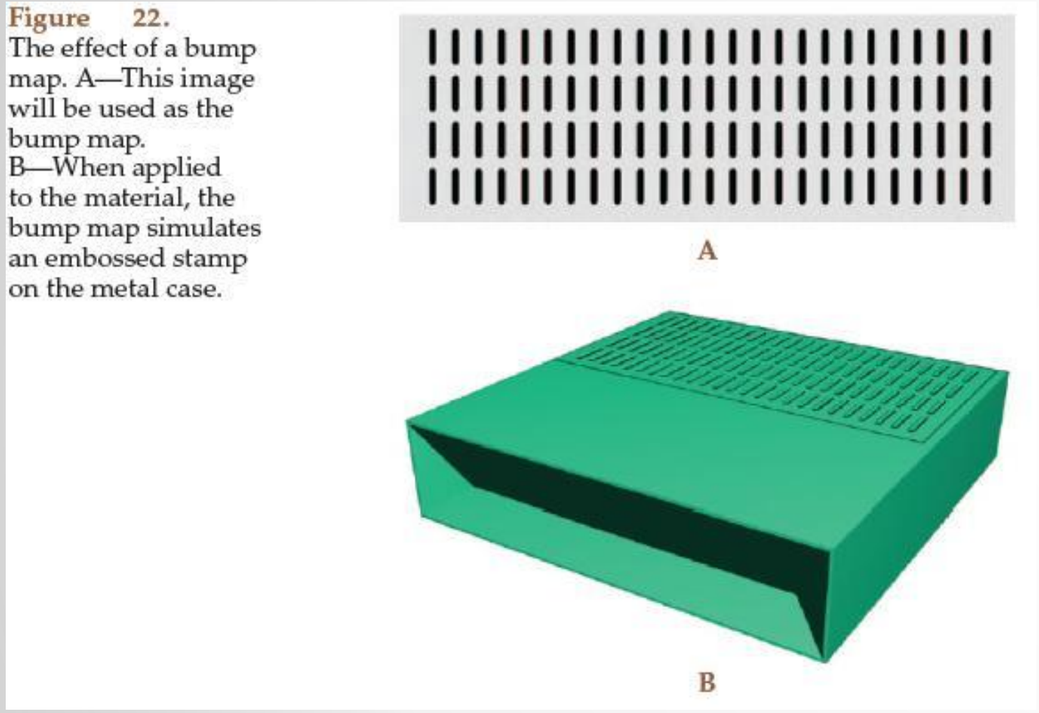
New Material from Scratch – Self Illumination

- Luminance is defined as the value of the light reflected off a surface.
  - Luminance (candelas per square meter)
    - Dim Glow 10
    - LED Panel 100
    - LED Screen 140
    - Cell Phone Screen 200
    - CRT Television 250
    - Lamp Shade Exterior 1300
    - Lamp Shade Interior 2500
    - Desk Lamp Lens 10000
    - Halogen Lamp Lens 10000
    - Frosted Bulb 210000

New Material from Scratch – Self Illumination

- Color Temperature property determines the warmth or coolness value of the color.
  - Color Temperature (degrees Kelvin)
    - Candle 1850
    - Incandescent Bulb 2800
    - Flood Light 3400
    - Moonlight 4100
    - Daylight Warm 5000
    - Daylight Cool 6000
    - Xenon Arc Lamp 6420
    - TV Screen 9320

New Material from Scratch – Bump



- The Bump category contains settings for making some areas of the material appear raised and other areas depressed.
- The image or texture used for this effect is called a bump map.
- Dark areas of the map appear raised and light areas appear depressed.

Session Feedback

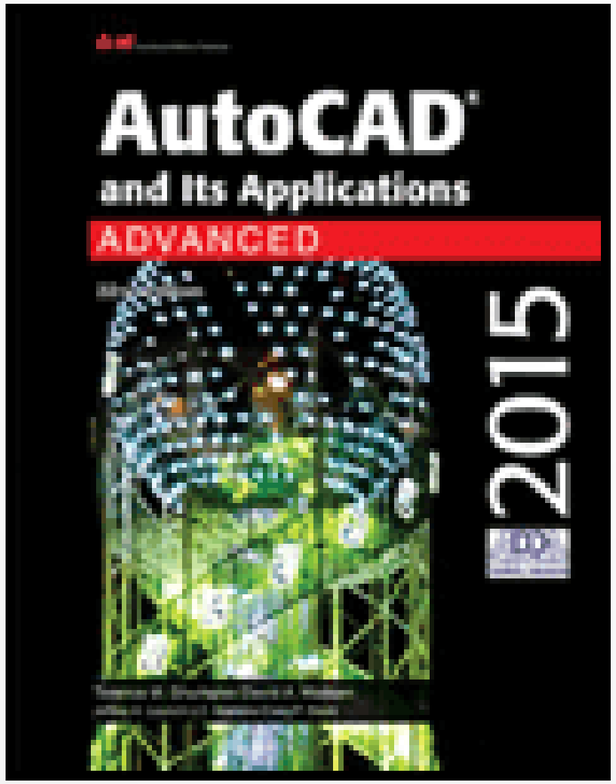
- Via the Survey Stations, email or mobile device
- AU 2014 passes given out each day!
- Best to do it right after the session
- Instructors see results in real-time

Study Buddies

Pass a business card with Introduction to Materials in AutoCAD 2015 on the back of the card.

Door Prizes

- Copies of AutoCAD and Its Applications – Advanced 2015



Questions

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