

- I. Constraints - An object used to constrain the position or orientation of another dag node.
  - A. What are Constraints
    1. Constraints can be any dag node such as a curve, object, skeleton, joint, camera, or light.
    2. Constraints can be applied to any dag node, including skeleton joints.
    3. The position of the pivot point and local axis of the constraint are the most important factors to consider.
    4. Why should you use them?
      - a. Since IK Handles don't have associated dag nodes, they cannot be grouped in a hierarchy.
      - b. Constraints create dag nodes in the SBD window, allowing for grouping.
  - B. Three Types of Constraints: Point, Aim, and Orientation.
    1. Point - the touching constraint.
      - a. The constrained object moves and rotates to touch the Point Constraint.
      - b. The constraint is moved to move the object.
    2. Orientation - the aligning constraint.
      - a. As the orient constraint is rotated, the constrained object maintains the same local axis orientation of the constraint.
      - b. The local axis of both the constraint and the constrained object are crucial in calculating movement.
      - c. Mainly used to maintain orientation regardless of the movement that occurs higher in the hierarchy.
    3. Aim - the aiming constraint.
      - a. The local axis of the constrained object points at the constraint, but does not touch it.
      - b. Useful when trying to have your character "look" at something.
      - c. It is best to determine which axis to constrain to before adding the Aim constraint.
- II. Constraining Objects in Alias
  - A. Object Edit -> Constrain -> Create Constraint (or constraining)
    1. Select the object you wish to constrain, then select Create Constraint from the Object Edit menu.
    2. You can select to create a point or orientation constraint.
    3. It is also important to create a Selection Handle for the constraint. (Allows for easy access in modeling windows.)
    4. **NOTE:** It is generally not a good idea to constrain a skeleton joint, as moving the joint will change the shape of the bones. It is better to apply the constraint to an IK Handle.
  - B. Object Edit -> Constrain -> Constrain to
    1. Select the object you wish to constrain, then select Create Constraint from the Object Edit menu.
    2. You can select to create a point, orientation, or aim constraint.
      - a. Point constrains an object to another objects pivot point position.
      - b. Orientation constrains an object to another objects pivot point orientation.
      - c. Aim requires you align the axis of the constrained object and the constraining object.

- i. Select the object you wish to constrain.
      - ii. Open the Xform -> Local -> Set Local Axes dialog box.
      - iii. You can reset the local axis of an object, or interactively reorient the axis of the object.
    - d. Select the object you wish to constrain to.
  3. It is also important to create a Selection Handle for the constraint. (Allows for easy access in modeling windows.)
  4. Constraints are indicated in the dag node by a small box in the top right hand corner.
- C. Grouping Constraints
  1. Objects constrained using Object Edit -> Constrain -> Create Constraint have associated dag nodes in the SBD window.
  2. Select the constraints you wish to group, and then Edit -> Group -> Beside the nodes together.
  3. Name the grouped set appropriately, and now both constraints can be moved as one.
  4. A good example would be the ankle/foot IK Handles. There are two IK Handles, which can be constrained to the ankle.
- D. Pivot Points and Constraints
  1. Constraints are referenced to the pivot point of the constrained object, or the pivot point of the constraining object.
  2. Xform -> Set Local Pivot can be a useful tool for constraining objects to a pivot point away from a piece of geometry.
  3. An example would be following a character with your camera.
    - a. Constraining the camera to the character would put the pivot point of the camera and the pivot point of the character in the same place, making it very hard to see the character.
    - b. Simply move the pivot point of the constrained point on the character to a point behind the camera, and the camera body will snap to that point.
    - c. Now when you move the character, the camera follows, and you can see things in the frame.
    - d. Much better than motion paths. Dag nodes are animatable and easily controlled over time.
- E. Deleting Constraints
  1. Select the object/dag node that is constrained.
  2. Delete -> del constraint to remove the constraint.