Changes from 3.1-3 to 3.2-1

1. Local space simulation
   A. Each hair solver can switch between local/world space simulation mode
   B. Typical use case – in case of abrupt linear/angular speed change or fast rotating motions, the hair simulation can be unstable or undesirable due to excessive inertial effects or erroneous collision handling. By using local space simulation, such artifacts can be greatly reduced by explicitly controlling the inertial effects.
   C. Usage
      i. Step 1: For a solver which has multiple hair systems, first check if the output curve groups of each hair system have identical transformation matrices.
      ii. Step 2: Choose or create a transform node that will act as the reference transform (for example, constrain an object to a face or a vertex of the base mesh using “Constrain>Point on Poly” command)
      iii. Step 3: Parent the output curve groups to the selected reference transform node which follows the base mesh motion
      iv. Step 4: Select a hair solver, or a hair system under the solver, and click “FXHair>Set Local Space Simulation”. To undo this, select a solver and click “FXHair>Set World Space Simulation” (Note that local space simulation is performed per solver, not a hair system, even though the inertial effects can be scaled differently per hair system as described below)
   D. Inertial effect control
      i. The solver and the hair system have following four scale parameters for each inertial effect. The scale parameters of each hair system are multiplied by the solver’s corresponding parameters before application.
         1. Linear Velocity Scale – affects the air drag force caused by the linear movement of the reference transform
         2. Linear Acceleration Scale – affects linear inertial effect caused by the linear acceleration of the reference transform
         3. Angular Velocity Scale – affects (1) centrifugal force, (2) Coriolis force, and (3) air drag force caused by the angular motion of the reference transform
         4. Angular Acceleration Scale – affects Euler force caused by the angular acceleration of the reference transform
      ii. Each of the above four parameters can be larger than 1.0, or even can be negative. Typical range would be 0.0~5.0
2. hrHairSystem added the attribute “Interaction Depth Color”
   A. Users can change the color of the visualized interaction depth for each hair system
3. Default curve sampling method is changed to “Match CV” from “Uniform”
4. “FXHair>Show/Hide XXX Curves” now works for all the selected hair systems and/or solvers
5. Bug fixes
   A. When a hair system has cached data and other hair systems under the same solver have no cache data, the maya crashes when re-opened and the time slider is not set at the start frame of the solver. This bug is fixed
   B. When an attach constraint has invalid CV indices, Maya crashes when re-opened. This bug is fixed.

Changes from 3.1-2 to 3.1-3

1. “FXHair>Convert>Create FXHair from Maya Hair”, “FXHair>Convert>Create Maya Hair from FXHair”, “FXHair>Convert>Create Maya Hair from Curves” are now operational.
   A. Through theses commands, the Maya’s hairSystem’s solver is replaced with FXHair by disabling the Maya’s hair solver and connecting FXHair’s out curves to the Maya’s hairSystem as static input curves.
2. Hair tip contact handling improvement
   A. Hair tips exhibited bouncing when those tips are only CVs in contact with collider in each hair curve. This bouncing is removed.

Changes from 3.1-1 to 3.1-2

1. Deactivating a hrHairSystem crashes Maya in certain condition
   A. When a hrSolver has multiple hair systems, deactivating one of the hair systems causes crash in certain condition. This bug is fixed.

Changes from 3.0-3 to 3.1-1

1. Hair-to-solid collision handling improvement
   A. Jittering between hairs and solid objects in contact are greatly reduced
2. Hair-to-solid friction improvement
   A. Provides more accurate static/kinetic friction behavior
   B. Note that the final hair-to-solid friction coeff is “hrCollider.friction X hrHairSystem.solidFriction”
3. Root length bug fix
   A. When the input curves have different parameter ranges with number of spans, the root length was miscalculated in case of “Match CV” and “Match EP” sampling methods. This bug is fixed

Changes from 3.0-2 to 3.0-3

1. hrSpring draw bug
   A. hrSpring didn’t draw the connections correctly in the default viewport. This bug is fixed
2. “FXHair>Connect Maya Field” supports connecting a field to multiple hair systems selected at once
3. “FXHair>Disconnect Maya Field” menu command is added
4. The following related nodes to hrHairSystem node which appear in the attribute editor are added
   A. hrCollider
   B. hrSpring
   C. hrConstraint
   D. hrAttachConstraint

Changes from 3.0-1 to 3.0-2

1. Goal Curves bug fix
   A. The “Attach Goal Curves” command didn’t work properly unless the objects are selected in a specific order. Now it works regardless of selection order. Select a group node of goal shape curves and the hrHairSystem node before running the command.
   B. The goal attraction force had no effect and this bug is fixed.
2. Live initialization of the spring and attach constraint

   A. hrSpring and hrAttachConstraint are re-initialized whenever they are activated from deactivated state.
   B. At the re-initialization, the rest lengths and connections are updated
3. Two types of hrSpring strength scales are added
   A. Strength scale on hair : scales the spring strength along the curve length.
   B. Strength scale on distance : scales the spring strength based on the distance between two vertices of each spring. The distance measures from 0 to the given maximum distance. This scale does not distinguish pull/push strength.
4. springStrengthMap is added
   A. springStrengthMap can be paintable on the hair base mesh as other physical attributes. (FXHair>Paint Attributes>Hair Attributes>springStrengthMap)
   B. This map scales the spring strength per each hair curve.
5. Friction and friction map for hrCollider is added
   A. The friction value in hrCollider mode had no effect for simulation, but it works now.
   B. The solid friction value at the hrHairSystem is multiplied to the value of each hrCollider.
   C. The final solid friction value for a hrCollider is = hrCollider.friction * hrCollider.frictionMap * hrHairSystem.solidFriction * hrImplanter.solidFrictionMap
6. “FXHair>Paint Attributes>Collider Attributes” command is added

Changes from 2.8-2 to 3.0-1

1. Added hrHairSystem node
   A. hrHairSystem has curve sampling methods, material properties, cache attributes, and goal curve control.
   B. A hair system can be transferred to another solver by “FXHair>Change Solver” menu command
2. Added hrSolver node
   A. hrSolver has solver parameters, information display options, and collision control.
   B. The displayed information is updated even when the solver replays the cache.
3. hrSpring node
   A. The springs can be created across multiple hair systems, given that all the hair systems belongs to the same solver
   B. If each hair system is connected to different solvers, the springs connecting those CVs are deactivated
4. hrSimulator, hrProperty nodes are removed
5. Backward compatibility
   A. The scene setup needs to be redone.
   B. Per frame cache files are compatible