

# **FEATURE HIGHLIGHTS**

**3ds max® 7**

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## >3D MODELING/TEXTURING WORKFLOW

> **EDIT POLY MODIFIER:** Artists gain significant workflow benefits through this parametric approach to creating and managing modeling and animation properties of Poly Objects – ultimately allowing for a creative and highly flexible approach to solving production problems.

### > EDITABLE POLY ENHANCEMENTS:

- > **PRESERVE UV's:** Make geometry changes to Editable Poly while keeping intact UV Coordinates. Users will be able to make adjustments to the geometry without having to edit UV Coordinates saving texture artists a great deal of time when modelers have to make changes after the UV's have been defined.
  
- > **BRIDGE TOOL:** Connect polygons and borders with full Taper, Bias, Smoothing, and Twist control for fine tuning the bridge operation
  
- > **CUT TOOL:** Optimized to remove creation of unwanted edges
  
- > **TURN EDGES:** Change the direction of edge triangulation with one click
  
- > **SELECT POLY BY ANGLE:** Selects all Polygons which fall within the user defined angle threshold – a rapid method for selecting areas of Polygons which may otherwise be difficult to pick
  
- > **RELAX VERTICES:** Now part of the core Editable Poly workflow, this normalizes the distance between selected vertices based on a user-definable threshold.
  
- > **MAKE PLANAR:** Takes any selection (including Soft Selections) and flattens it in X, Y, or Z using the objects Local Axis - greatly improved workflow for Poly editing.

- > **PAINT DEFORM:** This new highly creative tool deforms Poly objects using an intuitive brush interface – supports Push, Pull, Relax, and Revert operations with full support for Soft Selections. Brush Controls include extensive falloff control, Pressure Sensitive control over Brush Strength and Size, Mirroring, and Brush Tracing to view what parts of the model you have affected in one contiguous stroke.
  
- > **GENERATE AND RENDER NORMAL MAPS:** An industry breakthrough, this significant development allows artists in all disciplines to build extremely detailed high resolution meshes and then apply “normal maps” to low resolution models. For game developers, this technique allows next generation engines to visualize far more detail in real time environments. Visual Effects and Visualization artists will be also able to render these normal maps with mental ray and the native scanline render, giving them ultimate detail at render time but allowing them to work with extremely low resolution in the viewport.
  
- > **PAINT SELECTIONS:** Use the intuitive painting tools to make selections inside of **3ds max**, a highly artistic approach to building selection sets.
  
- > **HIGHLIGHT SEAMS:** Users will quickly see discontinuities in the mapping as they appear on the model and can interactively make the best decisions for ensuring smooth texture seams.
  
- > **DISPLAY OPEN EDGES IN UV UNWRAP:** Clearly view where edges are open in UV Unwrap window, giving artists an easy to read interface for troubleshooting the UV process.

> **COPY / PASTE MATERIALS, MAPS, AND COLORS:** Extending the already intuitive drag and drop method for propagating materials, maps, and colors – this new workflow gives added ability to use a “copy/paste” approach that users will find extremely useful for day to day operations.

> **PROJECTION MODIFIER:** A powerful tool for projecting the mapping coordinates (or any other existing vertex channel data) from one piece of geometry to another – for example, enabling clean low-resolution mapping information to be the basis for highly detailed, complex 3D shapes. Artists can also project textures from one object to another – allowing for transformation of highly detailed models with existing textures to be “baked” into a single texture map to represent the same detailed look with far fewer polygons.

# > SOFTWARE & HARDWARE RENDERING

## > MENTAL RAY 3.3

- > **AUTOMATIC PHOTON MAPPING DISTRIBUTION:** Indirect Illumination is improved with an adaptive assignment of photon mapping based on the scene lighting distribution, providing an industry leading global illumination model for film and visualization artists.
  
- > **SUB SURFACE SCATTERING:** New **mental ray** shaders are included for approaching Sub-Surface Scattering (SSS) that provide tremendous flexibility in production. These include a powerful SSS shader that uses physically accurate calculations to build the highest fidelity translucent materials, an SSS shader optimized for rendering Skin, and a fast SSS shader for compelling results without “absolute physical accuracy”.
  
- > **INCREMENTAL ECHO:** Boosts efficiency for non **3ds max** licenses of **mental ray**, including Linux licenses, *incremental echo* includes only the information which has changed from frame to frame – an adaptive approach that reduces calculation and network deployment time specifically for *.mi* files.
  
- > **RENDER TO TEXTURE INTEGRATION:** Artists can now use **Mental Ray 3.3** as their preferred renderer for the Render To Texture tool – increasing the levels of fidelity available for generating light maps, bump maps, normal maps, and even single-map representations of complex procedural and bitmap composites.
  
- > **MODULAR DX MATERIALS:** With this new workflow, **3ds max** handles Shader UI and the parsing/rendering is handled by the game developers. Any effect file (with appropriate parser) can be represented as a material within the editor and viewports.

- > **DIRECTX RENDERING OF “STANDARD MATERIAL”:** Quickly turn materials used in post production, visualization, and full CG films into game-ready .fx files. Support for the following maps and other Standard Material aspects in DirectX: Diffuse, Ambient, Specular, Opacity, Bump/Normal, Reflection, Self Illumination, Lighting Data, Light Attenuation, Light Color, Diffuse Color, Glossiness, Specular Amount, all saved to a .fx files.
  
- > **PIXEL-BASED CAMERA MAPPING:** Per-Pixel Camera Mapping allows the artist to project mapping from the direction of any given camera – bringing new levels of flexibility to film pipelines by giving 3D Digital Matte Painters better feedback on required changes and a highly productive way of re-rendering results simply by projecting the updated matte paintings directly back onto the original scene via the correct camera for the shot.
  
- > **RENDER TO TEXTURE ENHANCEMENTS:** Another excellent timesaver, artists can now render multiple passes of “Render to Texture” in a single session, independent of the map channels used. Support now also exists for individual unwraps and channels, giving added flexibility for processing of specific texture maps on character and environment components.
  
- > **DEVELOPER ACCESS TO THE DIRECT-X LAYER:** The developer has access to the DirectX layer allowing extreme control of what is displayed in the **3ds max** viewport. Also provided is SDK access to the **d3dxmeshes** (used in the cached mesh feature) providing simplified object export for DirectX.
  
- > **IMPROVED COMMAND LINE RENDERING:** now supports relative paths, improved error-handling, and messages from **mental ray 3.3**.

> **COMMAND LINE PLUGIN:** A powerful tool that allows the use of **backburner™** to manage any application, batch file, or process that can be controlled with command line switches.

## > ANIMATION WORKFLOW

- > **PARAMETER COLLECTIONS:** allows animators to define collections of parameters and custom attributes to be displayed on a per-character basis from a single, easy to use floating interface. This places the relevant toolset into the animator's hands so they can focus purely on generating lifelike motions. Technical directors can also specify notes and URL information per parameter, enabling facilities to link artists to original concept art and reference materials on a per-asset basis.
  
- > **SKIN MORPH MODIFIER:** This system allows for morphing surfaces to be controlled by the rotation of a joint – a classic example being muscle-bulging. Driven by a progressive morphing engine, artists can have skinned assets morph through several targets between the joint angle limits – adding amazing flexibility and placing character-driven deformations into animator's hands.
  
- > **SKIN WRAP DEFORMER:** Character Animators can now easily add clothing, props, and other details to their models by simply locking the new geometry to an existing skinning solution – the new elements will adhere to the skinned surface without the traditional caveats of creating new skinning data for each new element.
  
- > **REACTION CONTROLLER ENHANCEMENTS:** Event-driven animation gets a boost in **3ds max** with this intuitive method for linking animation properties to scene events — such as having a door open automatically when a character gets close enough. This dramatically reduces the time required for creating complex animation relationships and propagating changes throughout any series of linked animation events.
  
- > **EXPOSE TRANSFORMS HELPER:** Character Rigging gains significant speed increases through the exposure of **3ds max** object transforms direct to the UI - making the generation of complex rigs easier to create and faster to control.

> **CHARACTER STUDIO 4 ADVANCED ANIMATION TOOLS:** Discreet's premiere character animation toolset is now standard with **3ds max 7** – bringing award-winning non-linear animation and behavioral crowd simulation capabilities to the industry's most prevalent professional solution. Highly integrated with the **3ds max** animation subsystem, **character studio biped** characters can work with the standard **3ds max** bones, weighted controllers, keyframing tools, and skinning options.

**character studio\*** drives characters with its own dynamics core that allows for intelligent, and accurate, troubleshooting, identification, and adjustment of motions and character balance over the course of any given animation cycle.

Highly accessible from MAXScript and the SDK, **character studio** is a popular solution for today's character-centric gaming requirements and for film pipelines to easily integrate custom solutions.

\* For an overview of the **character studio 4** features, please refer to Appendix A.

## > GENERAL WORKFLOW

> **SMART OBJECT CULLING:** A utility that suppresses certain aspects of the scene based on a target frame rate specified by the user – ensuring a maintained level of interactivity.

**TURBO SMOOTH:** An optimized version of Meshsmooth that brings amazing speed to viewport operations, allowing for even more detail to be retained when needed.

> **SNAPPING IMPROVEMENTS:** Improvements to the general snapping engine allow for snapping of sub-object gizmo pivot points, includes a magnet feature that ensures objects and gizmos snap to intended targets more reliably, allows artists to assign hot keys to the various snapping options available, and also modelessly cycle through the snap types.

> **MOBILE GAMING:** Leading the charge in mobile game content creation tools, Discreet's impressive suite of game-specific features are now available for hand-held devices through the JSR184 file format, native within **3ds max 7**.

> **1<sup>st</sup> PERSON CAMERA:** Navigate 3ds max scenes with the same controls and fluid motions that have become extremely familiar to every person who plays 1<sup>st</sup> person video games - simplifying the way artists interact with the 3ds max scene and improving the speed at which environments can be built and edited.

> **DWG FILE LINK ENHANCEMENTS:** Improved design visualization workflow between 3ds max and AutoCAD/Autodesk Architectural Desktop with File Link. File Link allows the artist to import geometry from .dwg files and work with the data in 3ds max. If changes are then made to the original file, 3ds max can "reload" that file and all changed data will be reliably reflected in the 3ds max file.

> **CLONE AND ALIGN:** Particularly useful when a scene contains many copies of the same object, the Clone and Align Tool allows for artists to work with placeholder objects for scene placement and tweaking transforms, and then quickly update the placeholders with final scene objects from an easy to use interface. Used in conjunction with the existing Spacing Tool, Clone and Align is a great time saving tool for building and editing digital environments.

> **FLAT SHADED VIEW:** Ideal for accurately displaying textures without specular highlights, Flat Shaded view is a perfect way to check results of bitmaps created with Render to Texture

# **APPENDIX A: CHARACTER STUDIO 4**

Highlights of the **character studio** toolset include:

> **1-CLICK PARAMETRIC SKELETONS:** Artists can generate ready-to-animate, parametric character rigs extremely fast, removing the costly setup times associated with hand-building IK associations and joint constraints.

> **KINEMATIC BLENDING:** Forward and Inverse Kinematics can be used together on the same character to enable animators to use the approach best suited to the task at hand. IK Blend tools allow for hands and feet to have weighted attachments to scene objects – this makes throwing and catching a ball, rowing a boat, or dancing with another character easier than ever.

> **ANIMATEABLE PIVOT POINTS:** Change the axis of rotation for hands and feet over time, allowing for far more realistic representation of weight transfer through the body of a character.

> **HEAD TARGET** object gives the biped head a target to look at during the animation – this is a weighted target, so the Biped can be told to seek out the object over time, and then look away accordingly with a minimum of effort

> **FOOTSTEP-DRIVEN ANIMATION:** Whether roughing out an entire production for previsualization, or redirecting complex motion capture results, the Footstep Animation core of **character studio** is the only system of its kind that calculates character motions with the goal of keeping footsteps completely locked to the surfaces you want.

> **QUATERNION FUNCTION CURVES:** **character studio 4** was the first system to provide function curves that internally use quaternion interpolation – removing gimbal lock (or “flipping joints” from the animation equation, leaving artists to work with intuitive, accurate function curves.

- the interpolation is "geodesic" (most direct spline in rotational space) and therefore free of "extraneous swing" motion artifacts
- the rotations are order independent
- “best of both worlds” – the most advanced animation system commercially available.

> **ANIMATION LAYERING:** Adding even more power to the non-linear capabilities of **character studio**, non-destructive Animation Layers allows for directorial changes to even highly detailed motion capture files without animators having to manage existing keyframes. Resulting animations can then be “flattened” down to a single layer.

> **PARAMETRIC FOREARM SEGMENTATION:** Accurate deformations on forearms requires a detailed bone system – this fast, parametric approach gives animators precise control over character-specific forearm twists, greatly reducing time needed for subtle adjustments.

> **VISUAL CLIPBOARD:** A highly intuitive way of managing large amounts of animation tracks and character poses, making it extremely fast to identify and apply animation and pose data between limbs, entire characters, and even scenes.

> **THE WORKBENCH - MOTION PROPERTY ANALYSIS & VIZUALIZATION:** A

BIPED-specific keyframe editing, analysis, and motion fixing tool that gives animators access to Acceleration, Speed, and “Jerk” motion properties as well as a powerful system for analyzing and correcting motion properties.

> **ANIMATION MIXDOWN:** Traditional NLA systems are not able to completely blend vastly different animation tracks together whilst taking foot location/knee joint angle into account to ensure a smooth, realistic looking result. **character studio 4** is the first system to mix down non-linear mixes into a single clip while satisfying feet IK and knee joint motion constraints.

- Determines optimal locations for IK footholds during clip-interpolation through a sophisticated analysis of foot motion
- Takes knee hyper-extension into account & solves to remove knee “popping” during a transition
- Resulting mixes don’t violate crucial physical and kinematic constraints

> **ANIMATION MIXER:** A new approach to Non-Linear Animation (NLA), the Animation Mixer provides artists with a fluid, comprehensive constraint-based NLA system which not only allows for solid, useable mixing of unrelated animation clips – it also contains tools for ensuring that the resulting motion looks inherently natural.

- True timeline editing/management (a la Non-Linear Editing systems) such as Time warps (for the Matrix effect), Clip movement, Clip Scaling, turning tracks/layers on and off, and trimming
- Multiple viewing options including Local/Global Clip start/end times, transition length, Weight Curves, and Time Warps
- All standard keyframe and view management tools from **3ds max** have been integrated into the Animation Mixer
- Weighting controls lets you set which clip or transition track will be considered when blending with other clips/tracks
- Supports prop, keyframe, and motion capture information
- Automatically rebalances characters during a Mix, to retain natural bipedal body motion accordingly

> **EXTENSIVE MOTION CAPTURE FILTERING AND EDITING:** An impressive array of tools for importing, managing, and editing motion capture data. Filtering tools reduce “jitter”, allow for adaptive keyframe reduction, and give artists a way to absolutely “lock” the motion captured feet to a ground plane. With fidelity even for 3 systemic props (including retargeting capabilities), Toe Motion Capture, and support for multiple motion capture formats, **character studio** is the most advanced motion capture editing system available today.

> **BEHAVIOURAL CROWD SYSTEM:** Groundbreaking research in the field of behavioral animation yields a rich set of tools and controls for intelligent, behavioral

animation of large systems of arbitrary characters – **character studio 4** represents the world's most mature, commercially-available crowd solution today.

- Highly integrated with the large array of motion mixing and non-linear animation tools that come with **character studio** (motion mixer, NLA mixer, etc)
- Extensive set of modifiable attributes
- Scattering tool for easy setup of initial scene data for crowd solving
- Full proxy system for viewing crowd solutions whilst retaining full resolution at render time
- “Team” system allows for multiple behaviors to be applied within the same crowd simulation, allowing for separate collections of characters to seek vastly different goals – superior flexibility that can lead to the creation of highly realistic simulations
- Motion Retargeting allows even entire crowd simulations to be transferred between vastly different character types
- “Best-fit” algorithms use available motion libraries to calculate which portions of all available motion files will result in an accurate-looking solution, no matter how complex the global simulation requirements.
- Create custom behavioral algorithms through extensive scripting and SDK exposure