

**AMIC SEMINAR ON
DIGITAL ANIMATION FOR
TV & FILM,
SINGAPORE,
NOV 19, 1998**

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AMIC Seminar on Digital Animation for TV & Film,
Singapore, Nov 19, 1998 . - Singapore : Asian Media
Information and Communication Centre, 1998.

lv (various pagings)

This seminar provides a clear overview of the essential processes in digital animation, and of the mechanics to use technology and your creative skills to achieve better results. The programme includes concepts behind the computer animation process, budgeting, storyboard and creative process, live action filming, modeling, wiring, texturing, animating, dynamic systems, particle systems, lighting and rendering, compositing, and assembling the final product.



Asian Media Information & Communication Centre

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Seminar on **Digital Animation for TV & Film**

19 November 1998
Hotel Negara, Singapore





Asian Media Information & Communication Centre

Seminar on
**Digital Animation
for TV & Film**

19 November 1998, Hotel Negara, Singapore

What?

- A one-day seminar dedicated to provide a clear overview of the essential processes in digital animation, and of the mechanics to use technology and your creative skills to achieve better results.
- The programme will include concepts behind the computer animation process, budgeting, storyboard and creative process, live action filming, modeling, wiring, texturing, animating, dynamic systems, particle systems, lighting and rendering, compositing, and assembling the final product.
- Examples of great computer animation in film and video will also be shown.

**Who
Should
Attend?**

- Graphics Professionals in Print, Web, Video Animation
- Managers involved in computer animation projects
- Creative Directors from Ad Agencies, Product Development, Marketing, Sales
- Students & Budding Animators

REGISTRATION FEE: S\$200

How to register

Return the completed form on reverse side by fax/e-mail/post, or phone. Confirmation of reservation will be made upon receipt of registration & payment. Direct any enquiries to:

The Seminar Coordinator
AMIC, Jurong Point P.O. Box 360, Singapore 916412
tel: (65) 792 7570
fax (65) 7927129
e-mail: amiclinc@singnet.com.sg

**Who's
Presenting?**

Tom Wujec is the author of several books:

- DIGITAL RHETORIC: UNDERSTANDING & USING THE NEW MEDIA
- PUMPING IONS: GAMES AND EXERCISES TO FLEX YOUR MIND
- FIVE STAR MIND: PUZZLES AND EXERCISES TO STIMULATE YOUR CREATIVITY AND IMAGINATION

- **Tom Wujec** works as **New Media Manager** and **Global Field Marketing Manager**, Alias / WaveFront, Canada, the leading supplier of 3D computer graphics software
- He **produces CD-ROM titles**, internal & external websites, corporate presentations, demos and video to communicate, using interactive digital technology.
- He has **worked in almost every aspect of digital design** for over a decade, developing computer animation for television commercials, educational documentaries and IMAX movies.
- As **Creative Director** of the Royal Ontario Museum's Digital Media services, Tom **produced several award winning exhibitions**, including a computer generated life-size animation of a Malasaur dinosaur family, a reconstruction of a 2,500 year-old Chinese chariot and tomb complex, and visualization of the first computer called an Astrolabe.
- He has degrees in **Astronomy and Psychology**, a background in **Mathematics and History of Science**, and **extensive technical background in multi-platform computer graphics, animation and multimedia development**.
- He **lectures internationally** on the subjects of interface design and strategic planning of new media, and presents to Fortune 500 as well as cultural institutions in London & Washington.

Seminar Topics

Introduction to the Computer Animation

- Examples of great computer animation in film and video
- How computer animation has changed visual culture
- What you need to learn about animation

Overview of the Computer Animation Process

- There is no single process as each project has unique approaches
- There are (more or less) well-defined stages to developing animation
- People and roles in animation
- Types of computer animation projects: compositing, matching, real-time animation, character animation, flying logos, etc.

Concept and Budgeting

- Determining the need for Animation
- How to decide if CG adds value to the project
- Budgeting
- Resourcing

Storyboard and Creative

- Developing the creative brief
- Illustrating animation
- Planning for successive prototyping

Live Action Filming

- Recording backgrounds
- Compositing preparation

Modeling

- The process of building geometry
- Types of modeling tools and paradigms
- Examples of building up models
- Procedural Modeling
- Technical directors

Wiring

- Preparing characters for movement and life
- Building in Inverse Kinematics and Expressions
- Moving characters and objects through time

Texturing

- Adding surfaces to models
- The concept of Shaders
- The concept of bump and displacement maps

Animating

- The concept of key-framing
- Lip-synching
- Animation tools

Dynamic Systems

- Real-world simulation
- Gravity, Friction, Momentum
- New paradigms in Animation

Particle Systems

- The world of visual effects
- Explosions, Flames, Dust

Lighting and Rendering

- Converting Geometry, Animation and Dynamics to beautiful pictures
- The art of rendering

Compositing

- Combining computer animations with live action footage

Putting it all together

- Assembling all the pieces with sound to produce the finished product

Real-world Animation

- What really happens
- Deadlines and bottlenecks
- How to manage for change (and disaster)

SEMINAR SCHEDULE

0830-0900	: Registration
0900-1030	: Seminar Session
1030-1100	: Tea Break
1100-1230	: Seminar Session
1230-1400	: Lunch
1400-1530	: Seminar Session
1530-1600	: Tea Break
1600-1730	: Seminar Session

Registration Form

Registration Fee : S200 (includes Lunch & 2 Teabreaks)

Name (Dr/Mr/Ms):

Position:

Organisation:

Address:

Tel:

Fax:

E-mail:

Mode of Payment:

- I enclose cheque / draft for to the order of "AMIC Singapore".
- Telegraphic transfer to AMIC account 0-012538-057 Citibank N A, Orchard Road Branch, Singapore. Kindly add SG\$22 / US\$15 towards bank charges.
- Please charge my Credit Card:
 - AMEX
 - VISA
 - Mastercard

Card Number:

Name on card:

Expiry date:

Signature:

Date:

Cancellations received in writing before 8 Nov. 1998 will be refunded less S\$20 administration fee. Thereafter, cancellations are not refundable

Opening Speech by:

Param Singh Bal
Deputy Secretary-General
AMIC, Singapore

Seminar on Digital Animation for TV & Film

Hotel Negara, Singapore -19 November 1998

Opening Speech by : Mr. Param Singh Bal

Good Morning, Ladies and Gentlemen

Welcome and thank you for joining us in this one day seminar on Digital Animation for TV & Film. We are delighted by the great response and, personally, I am happy to see so many of my colleagues from Caldecott Hill.

We're in the midst of a Digital Revolution that may well surpass all previous revolutions in communications. The telecommunications, information-technology, and content-industries are converging very rapidly.

To discuss the meaning or context of how our lives may be changed, the only parallel we can draw is probably the discovery of Electricity. As Nicholas Negrophonte has observed: Being digital has three physiological effects on the shape of our world:

1. It decentralizes
2. It flattens
3. and it makes things bigger and smaller at the same time.

Today's seminar will highlight the wonders and applications of Digital to Animation. I am sure Tom Wujec will thrill and enthral you on the topic of Digital Animation. He will share with you not only the harnessing of the technological aspects but also how creativity and imagination have found a new opportunity in Digital Animation. He will demonstrate, that while Technology is certainly an enabler, its the human creativity that will lead to the magical interactive experience.

We are fortunate to have a multi-dimensional and multi-channel Tom Wujec to present this seminar. He is not only the master of the New Technology but also possesses a keen interest in subjects ranging from astronomy to psychology besides computers.

I'm sure that at the end of the day you would have added a few more tricks to exploit Digital Animation in your respective areas of work.

In organizing this Seminar, AMIC is fulfilling its mission to spearhead the development of media & communication expertise in Asia-Pacific and help to foster socio-economic progress of the region.

The topic of today's Seminar is also in keeping with the growth of Singapore as a communication hub. Digital Animation is not only of interest to our local broadcasters/academic institutions but also to production houses and multi-media companies operating from Singapore.

We have given you our corporate brochure sharing AMIC's activities include publications, research, training, documentation & events-management all of them related to Communication and Media. We have been based in Singapore for the last 27 years now, but we serve the Asia Pacific region. We are looking forward to our growth and contributions in the next century. We hope that your organization or you'll consider joining AMIC as a member and assist us in furthering our mission.

In today's audience I am happy to note that we have a good mix of academics and industry practitioners.

Once again, our sincerest gratitude for your presence and I wish you a very productive and interesting seminar.


Thank you.

The Agenda

- | | | |
|-------|---|--|
| 9:00 | <ol style="list-style-type: none">1. Introduction and Overview2. Business - Concept, Budgeting, Resources3. Storyboarding4. Preproduction5. The World of 3D6. Modeling7. Wiring | <i>User Interface Demo</i>
<i>Modeling Demo</i>
<i>Wiring Demo</i> |
| 11:00 | <ol style="list-style-type: none">8. Texturing9. Animating | <i>Shaders Demo</i>
<i>Animation Demos</i> |
| 2:00 | <ol style="list-style-type: none">10. Dynamic Systems11. Particle Systems | <i>Dynamics & Cloth Demo</i>
<i>Visual Effects Demo</i> |
| 4:00 | <ol style="list-style-type: none">12. Lighting and Rendering13. Compositing & Matchmoving14. Putting it all Together15. Real World Animation16. Summary | <i>Interactive Lighting Demo</i>
<i>Matchmoving Demo</i> |


Computer Animation For Film and Video Production

Tom Wujec
Amy Quek
Singapore
November 19, 1998




Goals of the Seminar

- Communicate the essential steps of computer animation
- Demonstrate the current CG software
- Illustrate the workflow for simple and complex computer animation
- Encourage a deeper understanding of the world of 3D





Your Hosts

- Tom Wujec
 - ◆ New Media Manager, Alias | Wavefront, Toronto
 - ◆ 15 Years of Production Experience in Computer Animation, Multimedia Production, Content Creation
- Amy Quek
 - ◆ Application Engineer, Alias | Wavefront, Singapore
 - ◆ Over 6 Years of Production Experience Commercial Animation and Multimedia Development




Alias | Wavefront

- World's leading innovator of computer graphics technology
- Over 500 employees
- Worldwide Operation
 - ◆ Corporate Headquarters: Toronto
 - ◆ Development Sites: Toronto, Santa Barbara & Seattle
 - ◆ Worldwide Field Operators
- 10 years of experience in core markets
- Close relationships with industry leading accounts

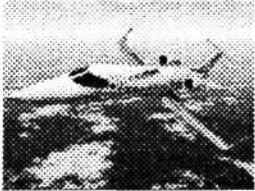


The Agenda

9:00	1. Introduction and Overview 2. Business - Concept, Budgeting, Resources 3. Storyboarding 4. Preproduction 5. The World of 3D 6. Modeling 7. Wiring	<i>User Interface Demo Modeling Demo Wiring Demo</i>
11:00	8. Texturing 9. Animating	<i>Shaders Demo Animation Demos</i>
2:00	10. Dynamic Systems 11. Particle Systems	<i>Dynamics & Cloth Demo Visual Effects Demo</i>
4:00	12. Lighting and Rendering 13. Compositing & Matchmoving 14. Putting it all Together 15. Real World Animation 16. Summary	<i>Interactive Lighting Demo Matchmoving Demo</i>



1. The World of CG

The Evolution of Computer Graphics has dramatically changed visual culture and how people work and are entertained.

The History of Computer Graphics

- 1960
- 1965
- 1970
- 1975
- 1980
- 1985
- 1990
- 1995
- 2000

Two Key Markets



Industrial Design



Entertainment

Entertainment Business Segments



Feature Film



Broadcast Video



Games & Interactive Media

Entertainment Business Segments

Feature Film Market

- Character Animation
- Visual Effects
- Compositing
- Painting



Entertainment Business Segments

Broadcast Video Market

- 3D computer graphic modeling, animation, visual effects and rendering
- Character animation
- Broadcast graphics and animated logos
- Post-production effects





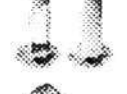

Entertainment Business Segments

Games & Interactive Media

- Real-time games
- Animated Sequences
- Character Design
- Real-time simulation




Design Business Segments

-  Transportation
-  Consumer Products
-  Design Firms
-  Technical Surfacing

Design Business Segments

Transportation Market

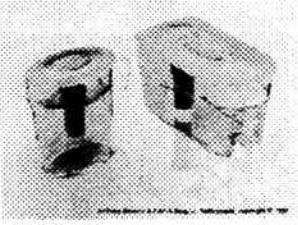
- Automotive Styling
- Industrial Equipment
 - Trucks
 - Tractors
- Aerospace
- Marine
- Trains



Design Business Segments


Product Design Market

- Consumer Electronics
- Housewares
- Hardware / Power Tools
- Appliances
- Medical Equipment
- Sporting Goods
- Furniture
- Fashion and Jewelry
- Toys
- Packaging




Core Technology

- 3D Modeling
- Animation
- 2D & 3D Paint
- Compositing
- Dynamics
- Matchmoving
- Sculpting
- Particles
- Rendering
- Visual Effects
- API
- Plugins
- User Interface



Industrial Design



Entertainment

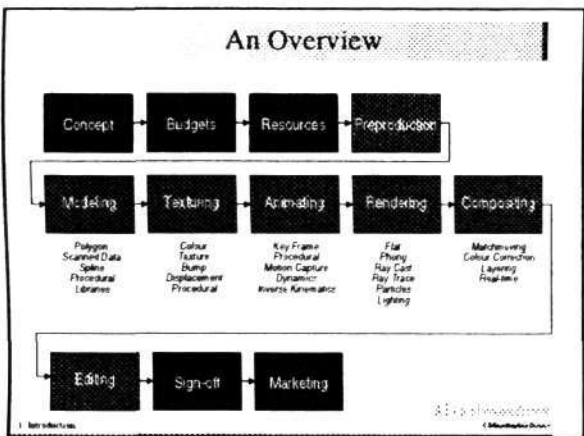
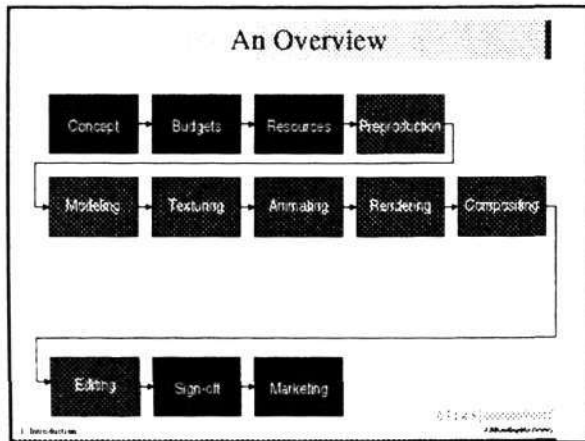
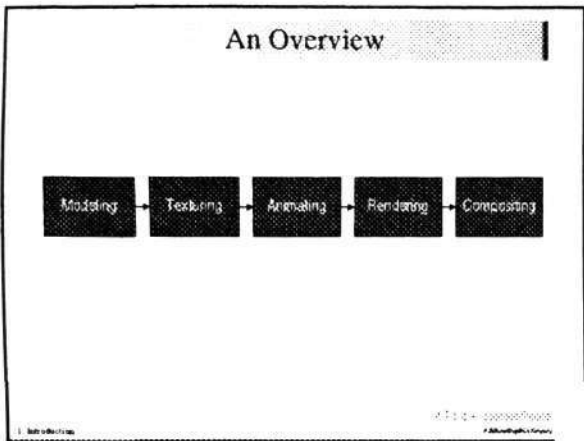
Entertainment Key Companies

- Alias | Wavefront
 - PowerAnimator, Maya, Composer, Zap!IT
- SoftImage
 - SoftImage, Digital Studio
- Side Effects
 - Houdini
- Kinetix
 - 3DS Max
- Lightwave
 - Lightwave

Computer Animation Process

There is No Single Unique Process

- Each project has unique challenges and opportunities
- The tools are so powerful and flexible that there are many ways to produce animations



2. The CG Business

Wide access to computer animation tools has created a wide range of successful business models, from small one-person shops to international CG production houses.

2. Computer Animation Basics © Nanyang Technological University

Range of Business Models

Small Production	Medium CG house	Medium Post Pro	Large CG House
One to Four People Each Person adopts many roles	Five to Ten People Each Person begins to specialize	Five to Fifty People CG Department from 2D Post Production	Fifty to one Thousand People CG Departments are highly specialized
	Modeler Animator Texturer Creative Director Technical Director Production Mgr	Flying Logo Compositor Creative Director Technical Director Asset Mgr Production Mgr	Wing MatchMover 3D Texture Painter Dinosaur Face Modeler

2. Computer Animation Basics © Nanyang Technological University

- ### Business Success Factors
- The Key Factors in Creating Business
- Relationships
 - ◆ Confidence, Track Record
 - Quality of Work
 - ◆ Effective for Client's Customers
 - Production Management
 - ◆ On-Time, On-Budget, Speed of Production
 - Cost
 - ◆ Competitively Priced
2. Computer Animation Basics © Nanyang Technological University

Clients

- Production Companies
 - Visual Effects
 - Character Animation
 - Television Effects
 - Episodic CG Animation
- Ad Agencies
 - Commercials
 - Broadcast Graphics
- Vertical Markets
 - Pharmaceutical
 - Publishing
 - Architectural
 - Theme Parks
 - Museums

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Budgets & Schedules

Flying Logo	Flying Dinning Logo	Character Animation	Feature Film Visual Effects
\$500 - \$1000 Second	\$1000 - \$2000 Second	\$2000 - \$5000 Second	Project Basis \$50,000 to Multi-Million
1 to 3 days	3 to 10 days	5 to 20 days	2 weeks to several months

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The Contract

- Creative Brief
- Characteristics of Animation
 - Duration
 - Action
 - Quality
- Schedule
- Type of Relationship
 - Input
 - Decision-making
 - Sign-off process

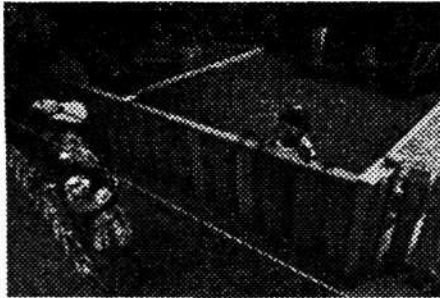
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3. Storyboard

The storyboard provides the creative concept of the animation and guides the entire production process, from modeling, animation, camera moves, rendering and final work.

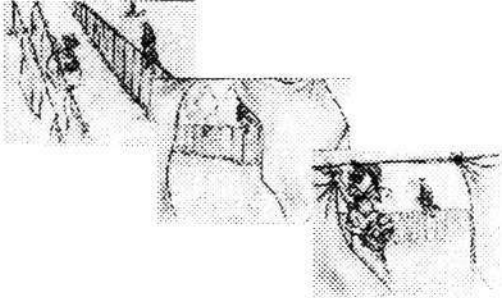
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Stain-X Commercial



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The Stain-X Storyboard



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4. Pre-production

Pre-production includes the activity of obtaining and creating the raw media ingredients that contribute to your computer animation.

4. Pre-production

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Pre (and Post) Production Elements

- Background Graphics
- Textures
- Voices
- Sound Effects
- Background Film

4. Pre-production

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5. The 3D World

Being successful in the world of Three-Dimensional computer animation means being able to visualize and manipulate objects, lights, textures and movements in your imagination.

5. The 3D World

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The User Interface

1. Menu Bar
2. Hotties: available when object is selected
3. Context-sensitive Menu / Marking Menu or right mouse button
4. Status line
5. Shaded copy of command menu items and tools
6. Feedback Line
7. Change Box
8. Timeline and Playback Fanger
9. Help line
10. Command line
11. Panels

5. The 3D World

The 3D World



5. The 3D World

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3D User Interface Demo

MAYA

5. The 3D World

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6. Modeling

Modeling is the process of constructing, manipulating, deforming, combining and editing geometry - the surface structure of objects.

6. Modeling

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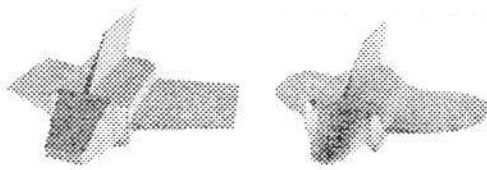
Types of Modeling

- Polygonal
- Spline
- Adaptive sub-division
- Fractal

6. Modeling

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Polygon Modeling



6. Modeling

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Polygon Modeling Tools



6. Modeling

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Spline Modeling

Non-Uniform B-Spline



6. Modeling

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Spline Modeling Tools

- Primitives (circle, arc)
- Create curve/curve-on-surface (CVs, edit points, sketch)
- Curve editing tool
- Offset curve/curve-on-surface
- Project tangent
- Circular fillet curve/surface
- Freeform fillet curve/surface
- Rebuild curve/curve-on-surface/surface
- Extend curve
- Insert knot curve/curve-on-surface
- Attach curve/curve-on-surface/surface
- Detach curve/curve-on-surface/surface
- Align curve/curve-on-surface/surface
- Copy/paste curve/curve-on-surface/surface
- Reverse direction curve/curve-on-surface/surface
- Duplicate curve
- CV Hardness
- Fit B-spline
- Point on object info (includes pos'n, tang't, curv'lure, norm'l, arc-length evaluator, etc.)
- Remove knot curve/curve-on-surface/surface Delete edit point/delete B-Spline
- Adjust weight curve/curve-on-surface/surface (use setAlt command only)
- Create primitive surfaces (sphere, cone, cylinder, cube, plane)
- Create text command
- Bevel surface
- Extrude surface
- Loft surface
- Planar surface (trim)
- Revolve surface
- Boundary surface
- B-rail surface (1, 2, 3+ rails)
- Intersect surface
- Project curve (direction/normal)
- Trim, untrim surface
- Fillet blend
- Project tangent surface
- Skin surfaces
- Insert ktoprim
- Create as polygons

6. Modeling

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Ways to Model

- By Hand / Mouse / Tablet
- By importing Scanned Optical Data
- By Tracing
- By using Procedural Modeling
- By using advanced brush-based tools

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Procedural Modeling

MEL Script

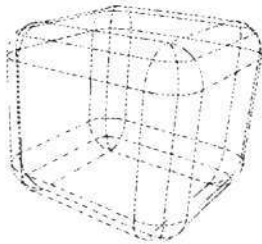
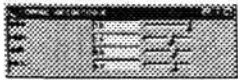
```
Script to create a coil spring if  
circle 11 creates a circle at the origin //  
move 4 0 0, 4 Moves the circle to X = 4 //  
move 0 0 0, 4 rotates Circle 1 rotatePivot 0 Moves pivot back to origin //  
for [Batch 0, 500, 10, 500, 10] //  
  duplicate // Duplicate a current object //  
  rotate -10 0 0 // rotates circle 30 degrees relative to Z //  
  move 4 0 0 // moves circle to 0.5 units relative to Z //  
end // all // selects all circles //  
loft 0, 10 // a surface from selected circles //
```



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Procedural Modeling



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Modeling Demo

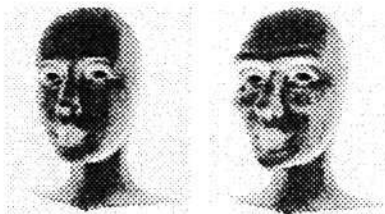
MEL's Chaps

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Maya Artisan

Sculpt Surfaces Tool

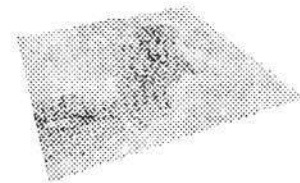


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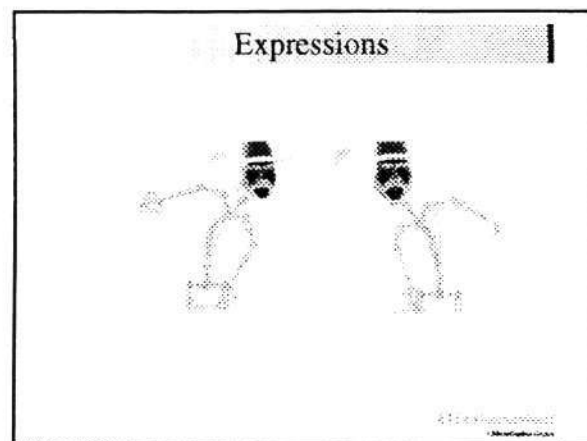
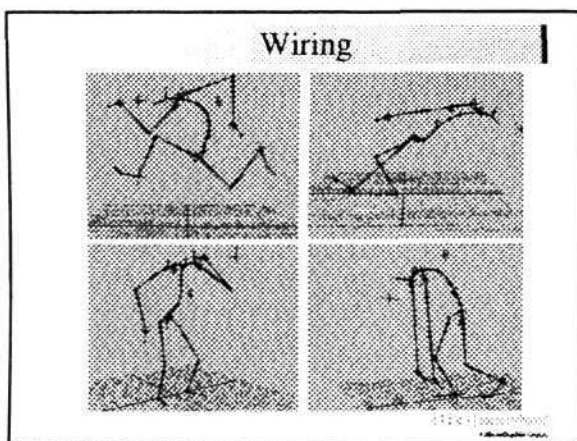
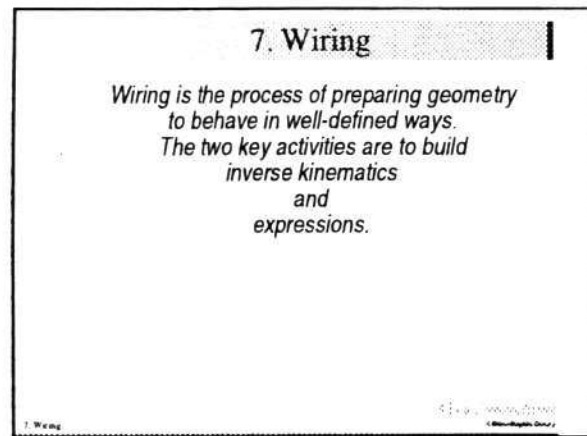
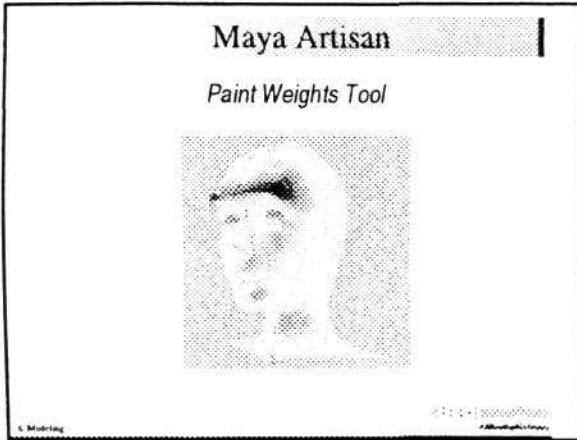
Maya Artisan

Paint Select CV's Tool



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Wiring Demo

MEL'S
WALK

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Tea and Info Relief Break



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Bingo the Clown



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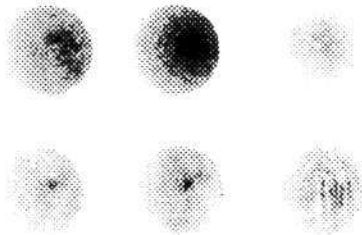
8. Texturing

Texturing is the process of creating and applying qualities to the geometry, such as colour, roughness, shininess, transparency among many other features.

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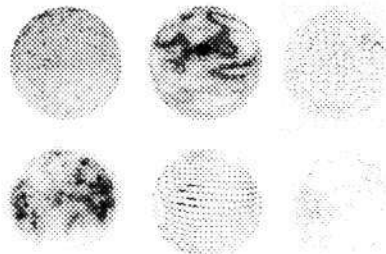
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Phong Shading



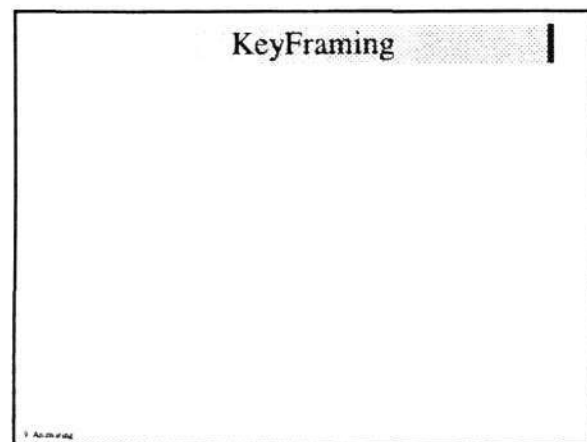
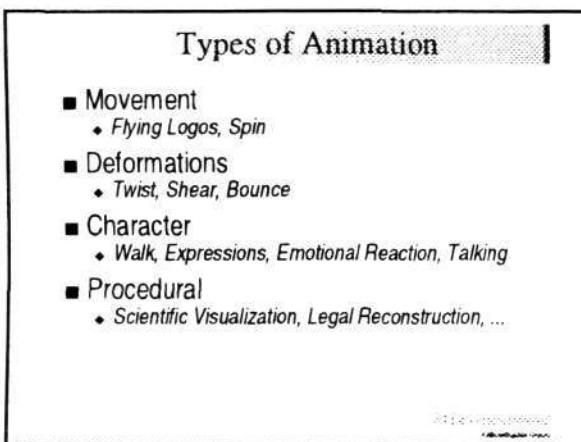
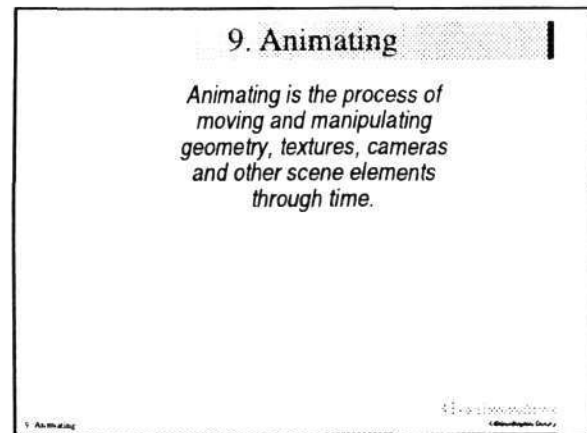
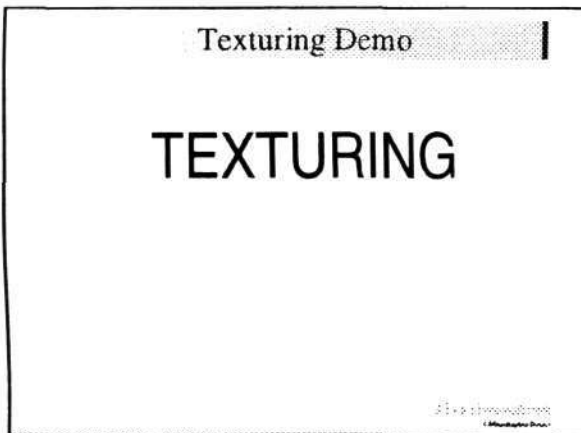
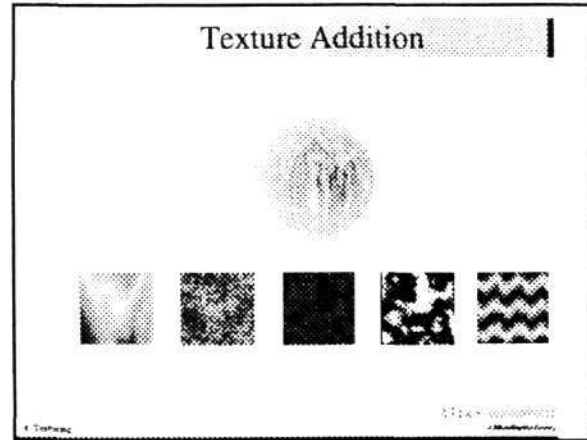
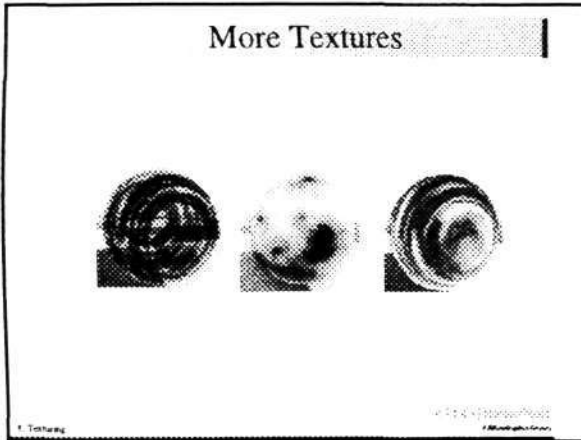
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More Textures

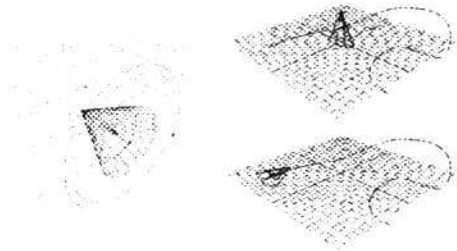


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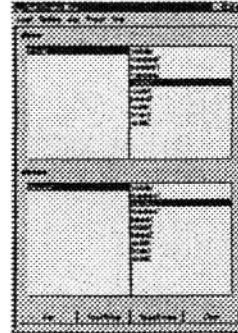
Animation Path



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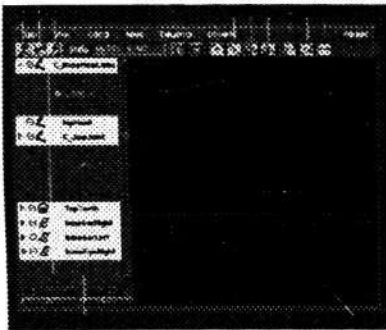
Set Driven Key



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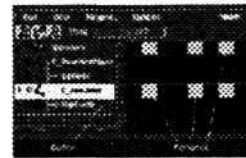
Graph Editor (Animation Editor)



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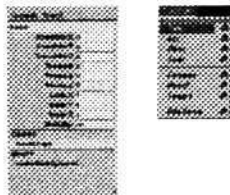
Dope Sheet



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Animation Tools



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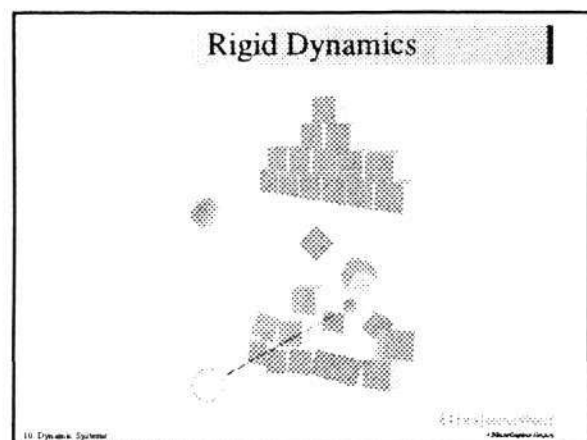
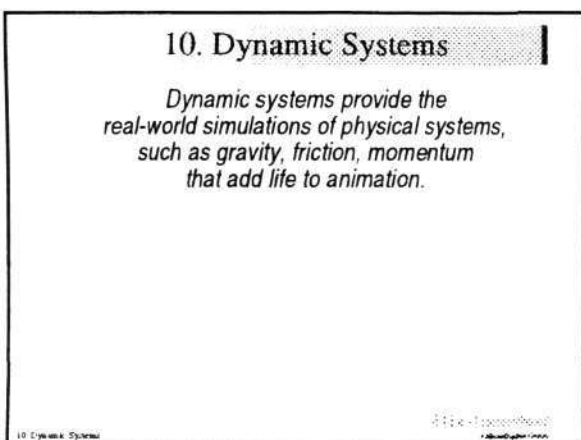
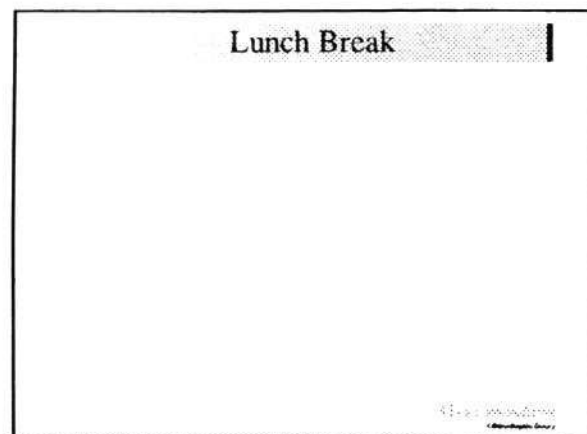
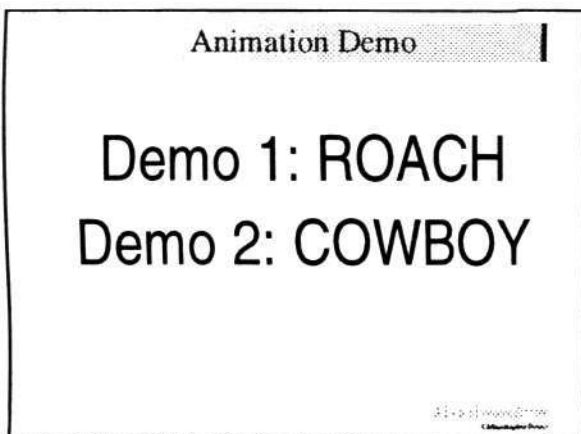
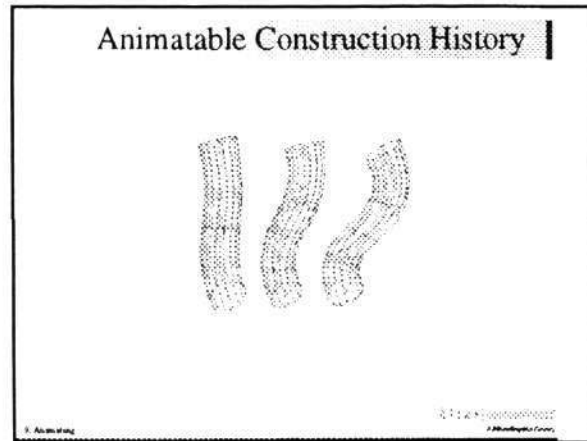
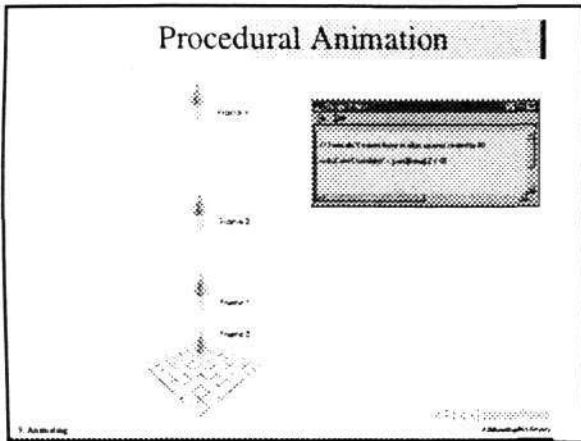
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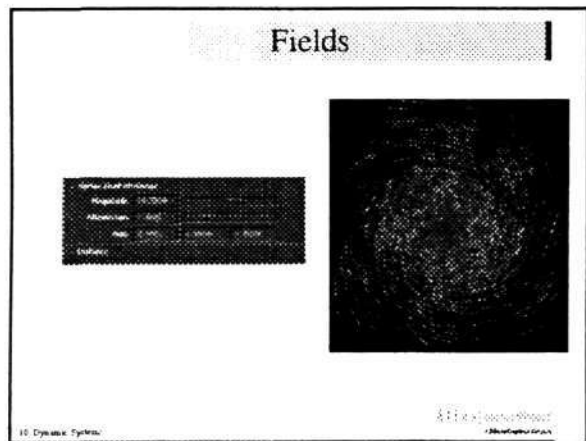
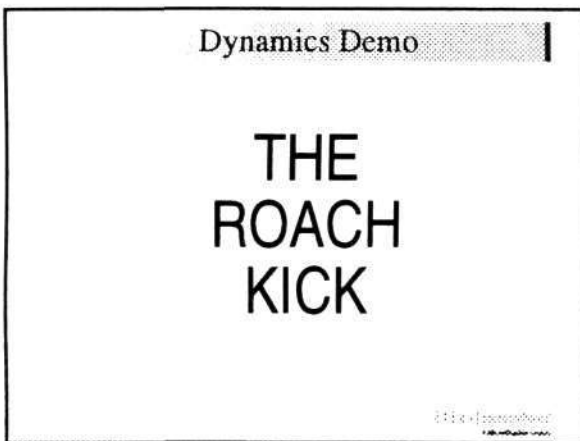
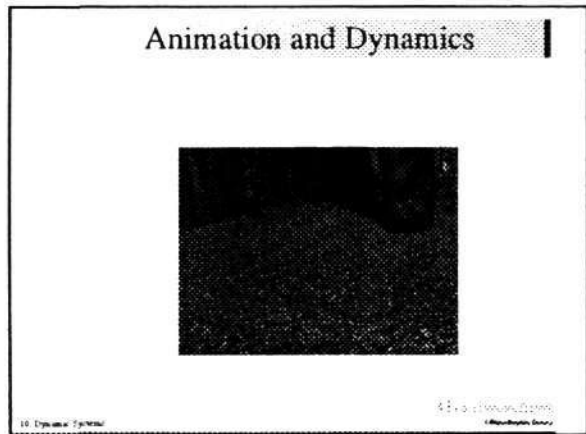
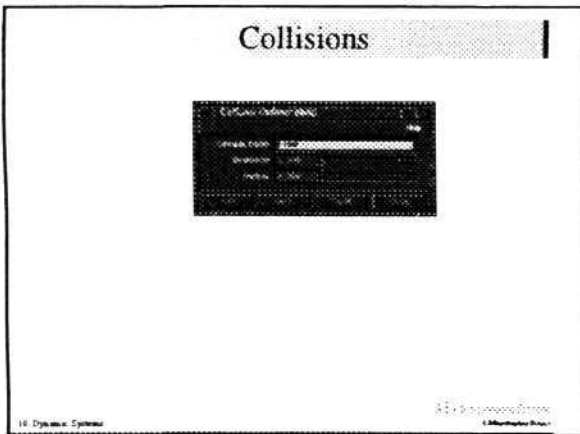
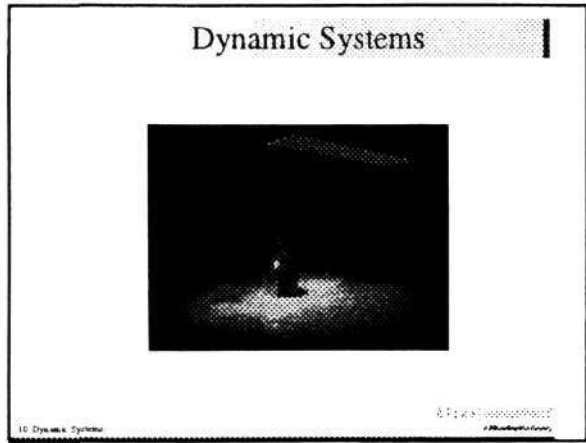
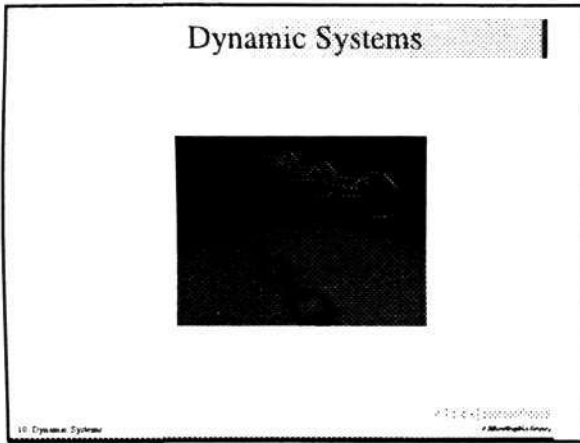
Expressions

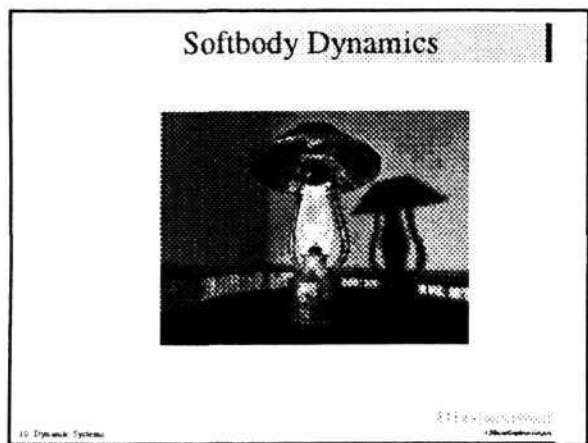
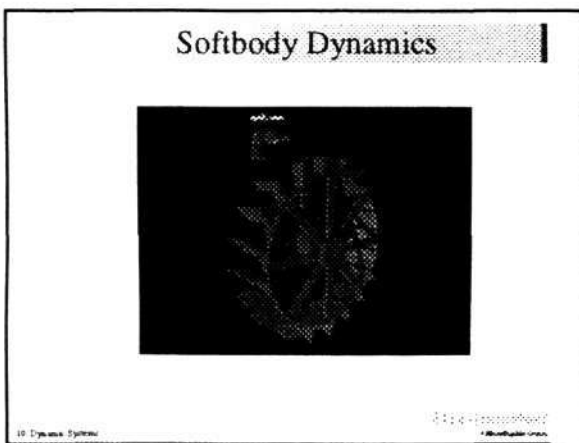
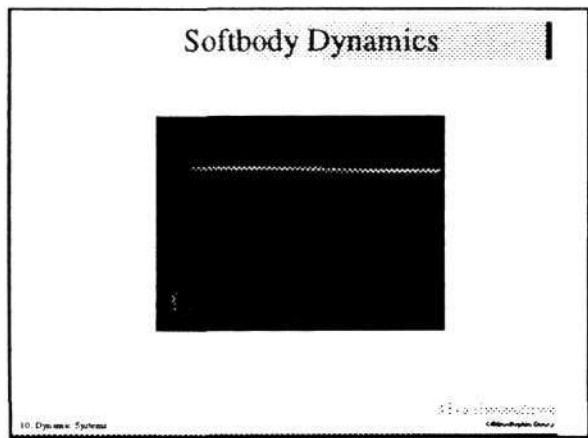
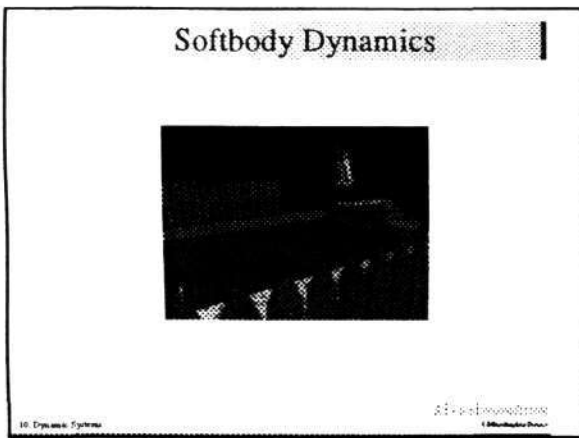
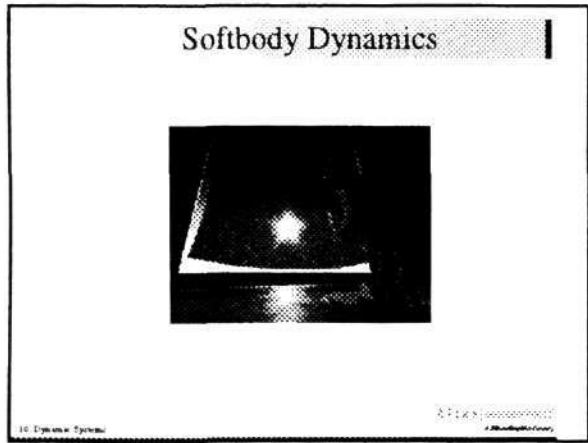
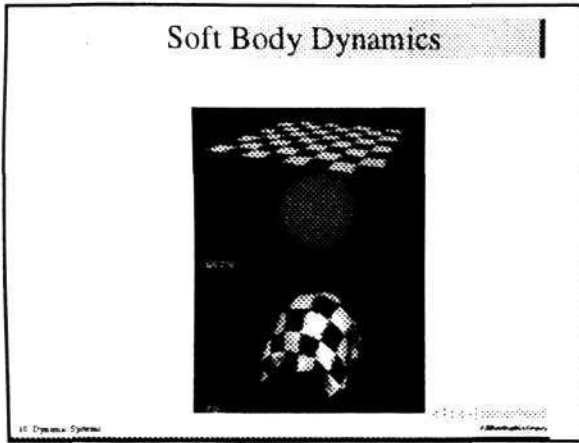


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Softbody Dynamics Demo |

CLOTH

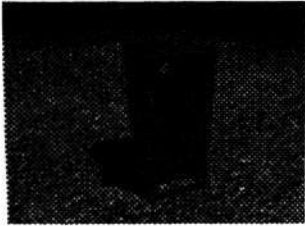
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11. Particle Systems |

Particle Systems provide the real-world simulation and creation of powerful visual effects, such as glows, explosions, dust, flames and sophisticated lighting effects.

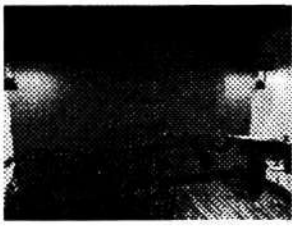
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Particles, Softbodies |



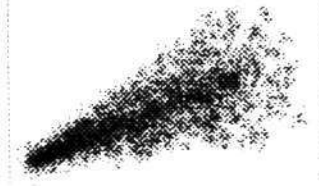
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Particles & Softbodies |



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Particle Systems |



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Dynamics Systems Demo |

Rocket Fire Demo

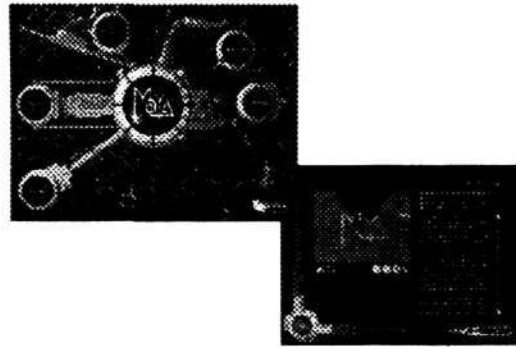
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Information Overload Break



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The Maya Demo CD-ROM



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12. Lighting and Rendering

Rendering is the process of converting the geometry, textures, animations, dynamics and particles into a series of high-quality still images.

12. Lighting and Rendering

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Lighting Models



- Integrates all lighting models (ambient, directional, spot, point)
- Lighting parameters such as color, intensity, decay rate, cone angle, penumbra, drop off, banders, decay region, etc.
- Digital OptiX, light glow, light fog
- Raytrace or Depth Map shadows with parameters such as shadow color, etc.
- Light Linking interface
- Interactive hardware lighting placement and control
- Look through selected light
- Lighting 3D Manipulators

12. Lighting and Rendering

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Rendering Quality

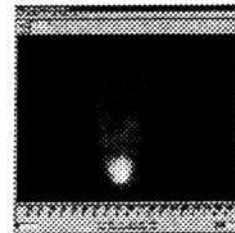
- Digital OptiX. Easily add realistic glows, halo, lens flare and other effects as part of the rendering process
- Software Particle rendering particle cloud volume for clouds, smoke, fire, etc.
- Selective Ray tracing
- Reflections and Refractions
- Super-sampling and A-buffer for anti-aliasing
- Advanced reconstruction filters to achieve softness
- Procedural backgrounds
- Adjustable 3D motion blur
- Fuzzy shadows



12. Lighting and Rendering

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Hardware Rendering



12. Lighting and Rendering

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Software Rendering



12. Lighting and Rendering

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Rendering



12. Lighting and Rendering

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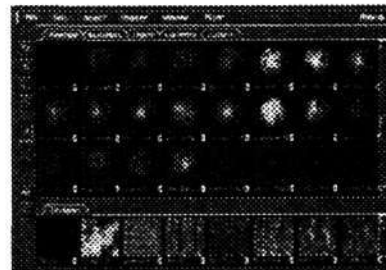
Types of Rendering Model

- All texture models integrated, including filtering (2D, 3D, environment)
- All illumination models integrated (Phong, Blinn, Lambert, etc.) including texture channels
- Surface Materials: Blinn, Lambert, Phong, PhongE [Explore]
- Layered shaders
- Volumetric Materials: Environment Fog, Light Fog, Particle Cloud, Volume Shader
- Displacement Shader
- 2D Textures: File, Bulge, Checker, Cloth, Fractal, Grid, Mountain, Ramp, Water
- 3D Textures: Brownian, Cloud, Crater, Granite, Leather, Marble, Rock, Snow, Solid Fractal, Stucco, Wood
- Environment Textures: Ball, Chrome, Cube, Sky, Sphere
- Convert Solid Texture
- Digital Opt FX shader glow

12. Lighting and Rendering

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Shader Networks



12. Lighting and Rendering

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Rendering Demo

INTERACTIVE LIGHTING

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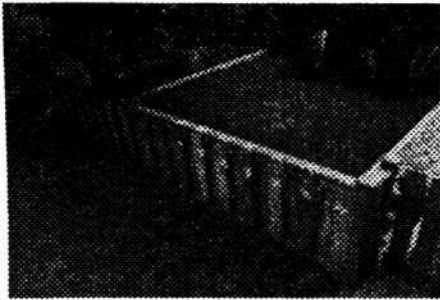
13. Compositing

Compositing is the process of combining several layers of computer animation (and live action) to streamline the production process as well as to create new types of interesting visual effects.

13. Compositing

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Background



13. Comp 07 04g

0114 x 1000px 00000
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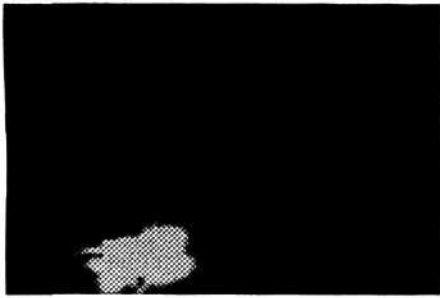
Edna



13. Comp 07 04g

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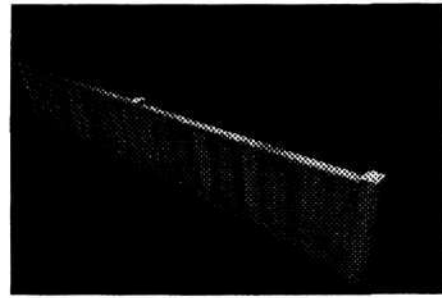
Edna's Shadow



13. Comp 07 04g

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CG Fence



13. Comp 07 04g

0114 x 1000px 00000
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Vera



13. Comp 07 04g

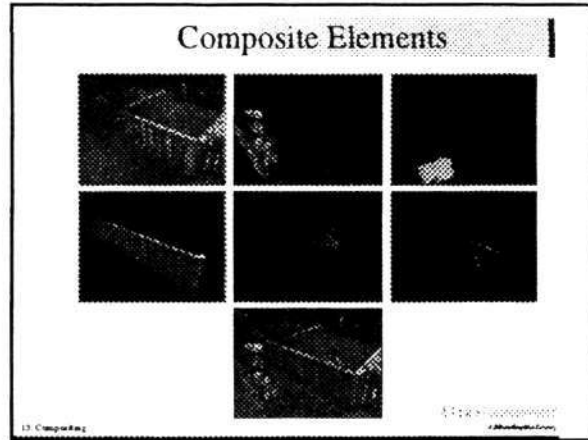
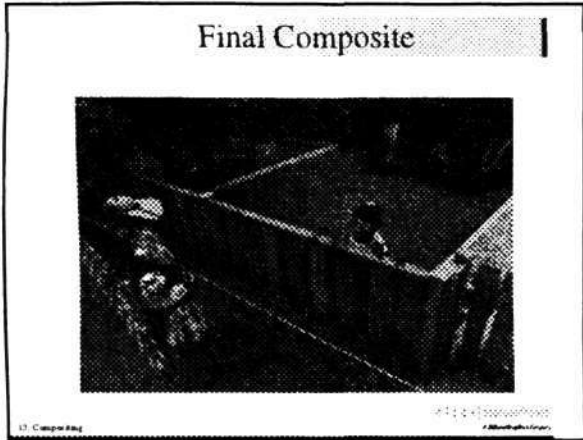
0114 x 1000px 00000
© 2007 Autodesk, Inc.

Vera's Shadow



13. Comp 07 04g

0114 x 1000px 00000
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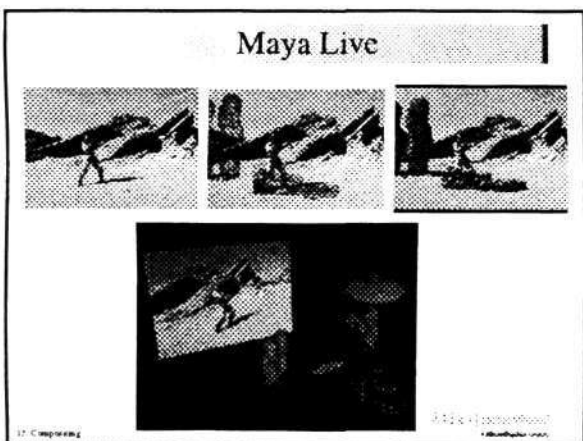
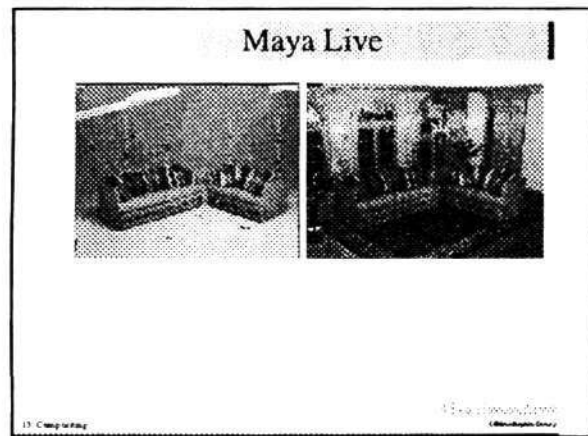


Maya Live

3D Graphic & Live Action Integration Module

- Place 3D Graphics into Live Action Scenes
- Place Real Objects into 3D Virtual Environments
- Works from live-action footage without survey data

17. Comp@ring



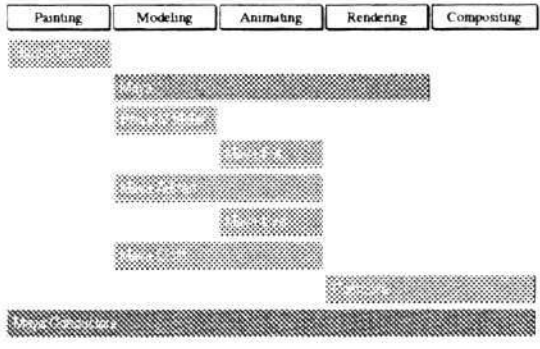
14. Putting it all together

Delivering a full computer animation now can involve the use of a wide range of production tools.



Maya Product Family



Painting Modeling Animating Rendering Compositing



Maya

Leader in Character Animation & Visual Effects



- Performance
- Most Productive Environment
- Technical Integration
- Digital Puppets
- MEL Scripting

Maya PowerModeler

Advanced Modeling Module

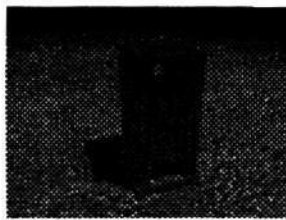

- Extends Maya's modeling tools to create precise complex geometry
- Rich modeling tools
 - Booleans
 - Align
 - N-Sided Surfaces
 - Rebuild Surface
 - Curve Networks
 - Brail
 - Swept
 - Curve & Surface

Maya F/X

Particle Effects and Softbody Module



- Integrated Particle Effects
- Integrated Softbody Objects
- Forces
 - Gravity
 - Wind
 - Turbulence
 - Drag
 - Vortices

Maya Artisan

Advanced Sculpting Module

- Advanced Modeling and animation tool with revolutionary interface
- Provides intuitive control of traditional artist brush and sculpting tools
- Converts a time-consuming process into a simple process

Maya Live

3D Graphic & Live Action Integration Module

- Place 3D Graphics into Live Action Scenes
- Place Real Objects into 3D Virtual Environments
- Works from live-action footage without survey data



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Maya Cloth

Fabric Module

- Create Realistic Clothing
- Moves, folds and gathers like real cloth
- Make tents, sails, pages and other fabric-based objects
- Fastest solution available

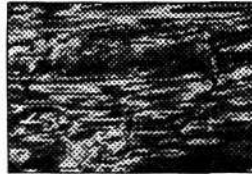


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Maya Composer

Advanced Compositing System

- The workhorse of the film and video markets
- Flexible compositing, color correction and visual effects
- Integrated with 3D applications
- Open architecture for 3rd party plug-in developers



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Maya StudioPaint 3D

Advanced 2D / 3D Integrated Paint System

- Production proven in Film and Games
- 3D Painting on all Geometry
- Finest painting and brush tools on the market
- Fully integrated with Maya



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15. Real-world Animation

*What really happens
Deadlines and bottlenecks
How to manage for change and disaster.*

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16. Summary

Computer Animation is an exciting industry that will continue to evolve.

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