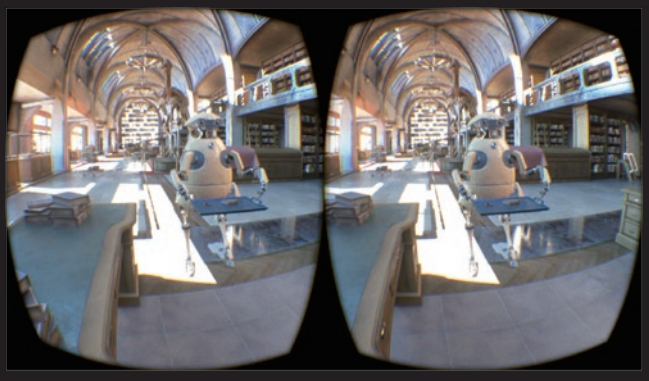
Silicon Studio

Mizuchi™

The Real-time Rendering Engine

Create visuals in real-time



Visualize world class CG results in real-time
with the Mizuchi Rendering engine.

Mizuchi is a real-time rendering engine that produces highly realistic CG content.

Mizuchi is a product developed by combining various cutting-edge real-time CG technology that Silicon Studio has been developing since its foundation. Not only can Mizuchi render a variety of materials in quality close to live action images, it also is light weight and high speed allowing Mizuchi rendered CG available to productions for high-end PC's, gaming PC's, game consoles, product visualization, cinematics, and a wide range of potential usages. The power of real-time rendering allows you to create interactive content that can be operated freely all in real time.

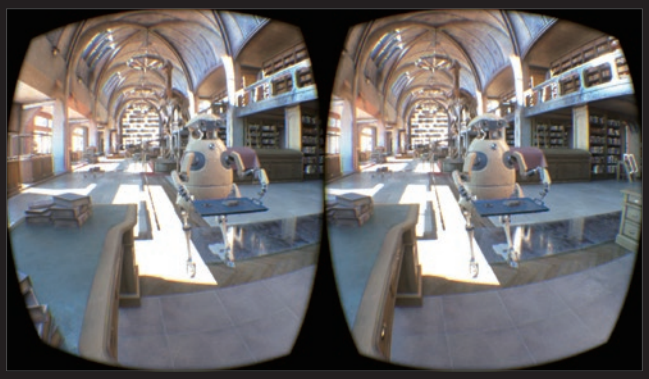
Produce lifelike configurator applications with real-time CG

Utilizing Mizuchi, easily produce configurator applications (apps that allow you to freely and smoothly customize color, options, backgrounds, etc to change the appearance and feeling of a product) by rendering various materials such as metal, resin, rubber, glass, leather, cloth, wood, etc. in stunning lifelike CG. For example, if you were to create a virtual model of a condominium with Mizuchi, you would be able to move around in the room environment freely with realistic image quality, while at the same time being able to smoothly change the sofa, table, color or material of the curtains or wallpaper to your liking without any loss to quality. With an actual model room it's impossible to prepare examples of every space available. If created virtually in CG utilizing the floor plans, it's possible to prepare every room on every level.
Mizuchi makes effective use of IBL tech (Image-based lighting), which acquires light information from photos (HDRI) and automatically calculates correct lighting reflection in a CG environment. This tech makes it possible to accurately create the indoor lighting environment in a virtual model room, and properly represent the brightness and changes of light from day to night or other conditions.

It is also possible to create a car configurator with interior, body, color, paint type, headlights, tires, seat, dash, and other materials that are almost indistinguishable from the real thing. For both real estate and auto industries, not all options can be shown in showrooms, however through CG and virtual models, it's possible for customers to explore every option pattern and customize to their tastes.

VR content creation that balances power and speed

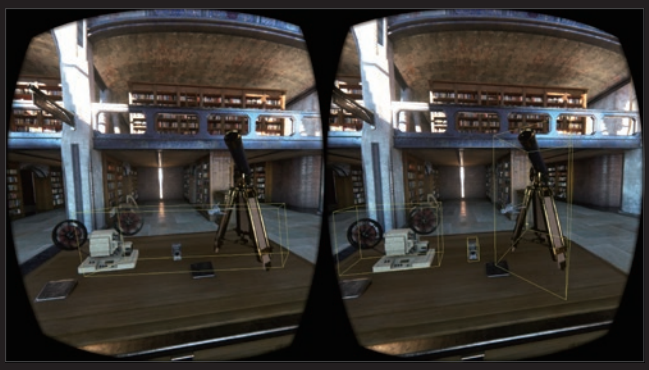
Mizuchi supports real-time CG VR content production, an exciting new market where many industries have begun to use content, but with large variation in performance and quality. With Mizuchi, build virtual spaces that when viewed in an HMD (Head Mounted Display) will be nearly indistinguishable from reality. Create CG model rooms with lifelike interiors, or apps where you step into a car, and feel like you are really in the driver's seat.
When creating VR content in 3D CG environments, if the frame rate (frames per second) is not enough, it can easily cause motion sickness. Many new methods have become common that simplify images and give priority to processing speed. Mizuchi combines high speed and expressive power allowing you to create content as you desire.

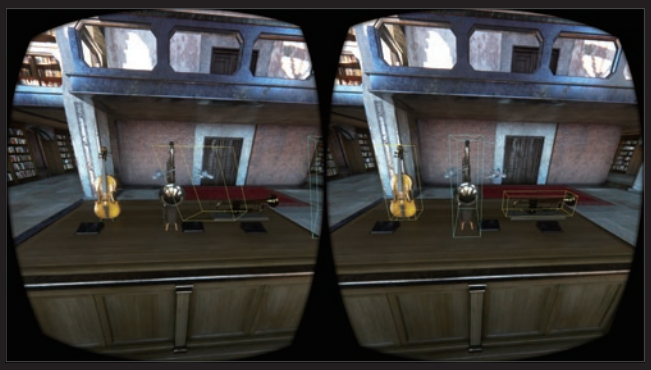


VR concept and quality

The concept of VR has always been to provide a virtual alternative to the real world, and for years the power of devices and software has stood in the way. Now we have mass marketed HMD's with stunning resolution, but to meet the 90 FPS standard to avoid motion sickness, content creators have had to sacrifice visual quality for performance.

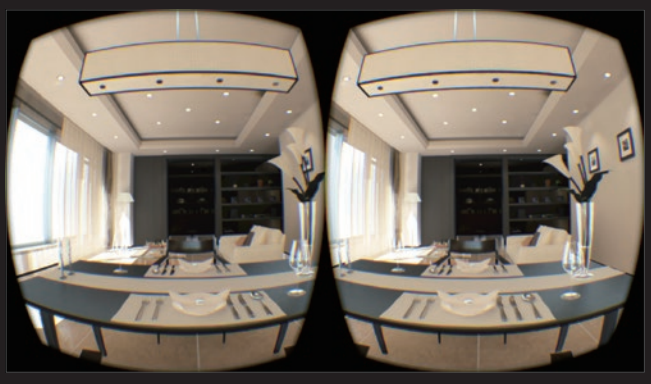
Mizuchi bridges this gap through high speed operation and high powered real-time rendering. With advanced textures and materials, the dream of walking down the halls of an ancient library out of the pages of fantasy yet indiscernible from real life, can now become a reality.





Utilization

The application of Virtual reality can extend far beyond that of just gaming. From architectural creations like model rooms, houses or stylish resorts, to product development showcase for automotive, realistic retail solutions, entertainment and amusement park attractions, and training tools for a variety of industries; there is a multitude of content to develop. For the most real results and best performance to be found, Mizuchi is the answer.



High texture expression to suit all needs

Automotive based materials

Automobiles contain a wide variety of textures in one product, and require different textures even if the real compound is the same. Mizuchi can reproduce textures and color, and correctly express the influence of reflection and transmission of light in natural CG.

1 Leather seats 2 Tires, Aluminum wheels 3 Dashboard panel 4 Body

Model room / Home / Architectural based materials

In real estate, it's important to display not only the floor plan, but also furniture and furnishings to express a real living environment. With Mizuchi's expressive materials and accurate lighting, create enchanting and lifelike CG model rooms and living spaces.

1 Low table with glass top 2 Upholstered couch & cushions 3 Curtain allowing natural light in 4 Stainless steel kitchen faucet and sink

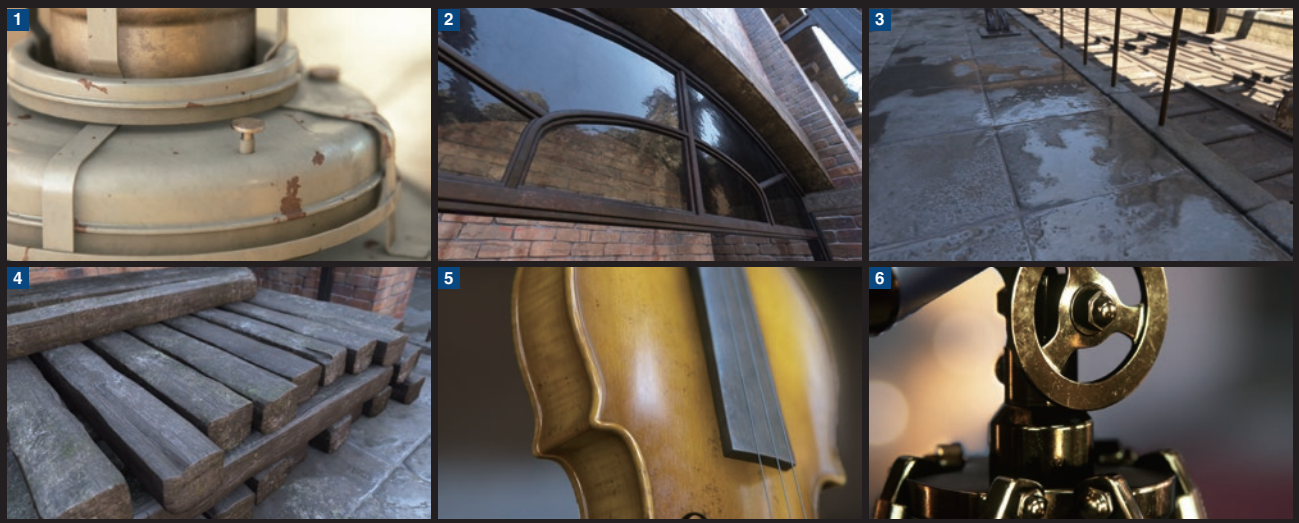
Hyper photo-realistic character expression

People are composed of many elements such as hair, skin, eyes, teeth, and the clothes they wear. Unlike wood and other materials, these are multilayered structures stacked with low transparency materials. Skin is separated by the dermis and epidermis, so it's necessary to express not only light reflected on the surface but also light scattered and emitted after it penetrates the skin (Subcutaneous dispersion). We interact with people daily, but when creating a person in realistic CG, it's important not to surpass the line of "uncanny valley" which can cause a sense of discomfort. Mizuchi's tech aims to express photo realistic characters in real-time CG while surpassing this level.

1 Face 2 Skin, Wrinkles 3 Hair 4 Clothing (Kimono)

Express textures with fine details

Mizuchi can not only express realistic products and people in CG, but also fine details such as weathering, rust, wear and scratches. This allows for recreation in CG of the atmosphere of exploring inside historical buildings, museums, and other fantastical sites.



1 Rusted stove 2 Glass windows in an old building 3 Wet cobblestones 4 Old timber 5 Antique violin 6 Metal pieces with aging and scratches

4K HDR real-time CG content production

YEBIS post optical effects are standardly installed within Mizuchi, allowing for support of real-time 4K HDR CG content production. Even though there are several system methods to produce in HDR, such as Hybrid Log-Gamma (HLG) and Perceptual Quantization (PQ), Mizuchi is being developed so that any video output can appropriately correspond according to the method used on the display side. Along with BT.2020, used by most HDR compatible displays/ TV's, and DCI-P3, the digital cinema standard, support is available for a range of color spaces.

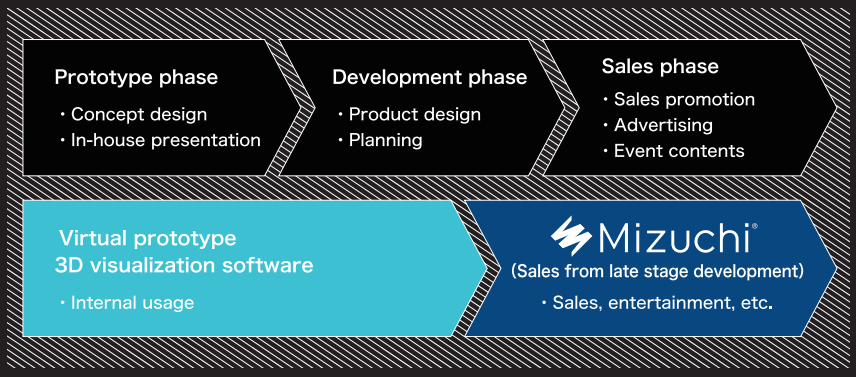
Left : HDR Right : SDR

Vividly enhance images with the power of light

Advanced lighting tech is essential when creating convincing natural, realistic images. Mizuchi employs Silcion Studio's post-effects middleware "YEBIS", which boasts some of the best lighting techniques available. Accurately reproduce a wide range of naturally occurring camera lens effects, such as depth of field, motion blur, bokeh, glare, an array of lens simulations, aperture values, and more. Balance quality and performance to suit input and output device needs. Create artistic CG images that can be used in production a wide range of fields.

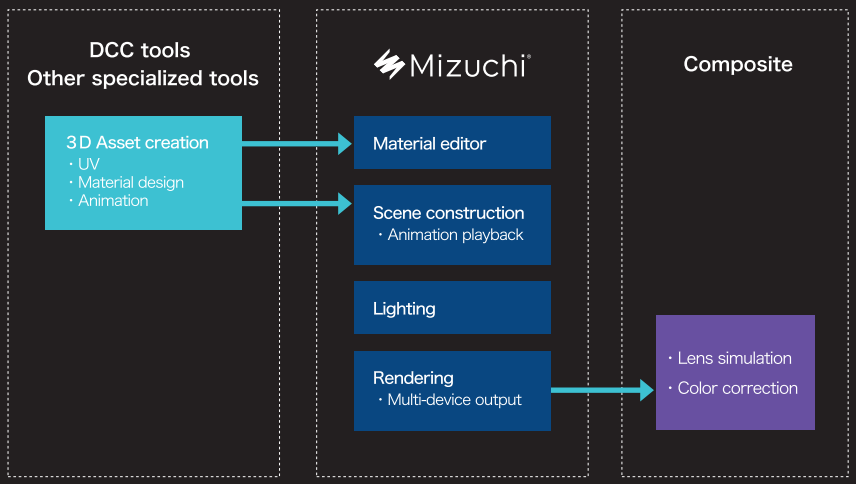
Workflow

Product prototype design workflow

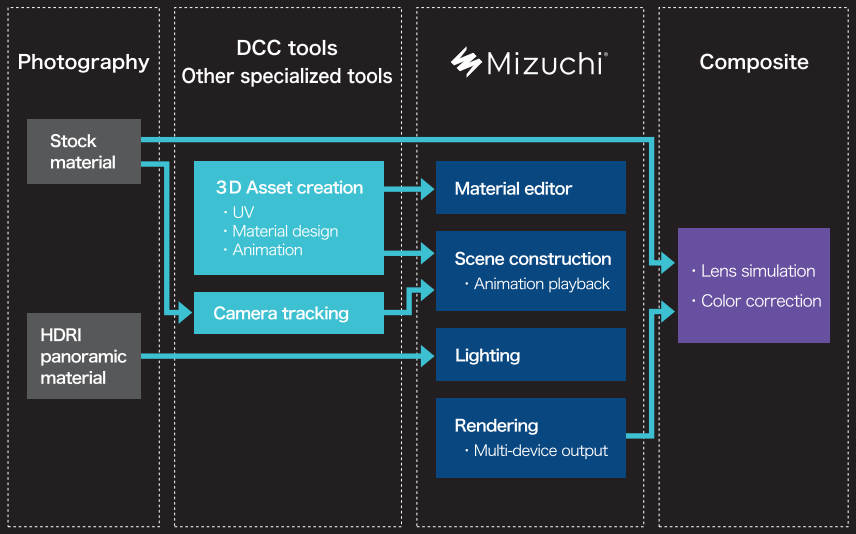


Even with common prototype design tools, it's possible perform high-quality, high-speed real-time rendering. Workflows can be unified in ways, such as processing product model data to make promotional material, or using model data to create interactive promotional content. By incorporating Mizuchi into workflows in the later stages of product prototype design development, you can create high quality 3DCG images, videos, and applications, making it an effective sales and promotional content creation tool.

Digital entertainment production workflow



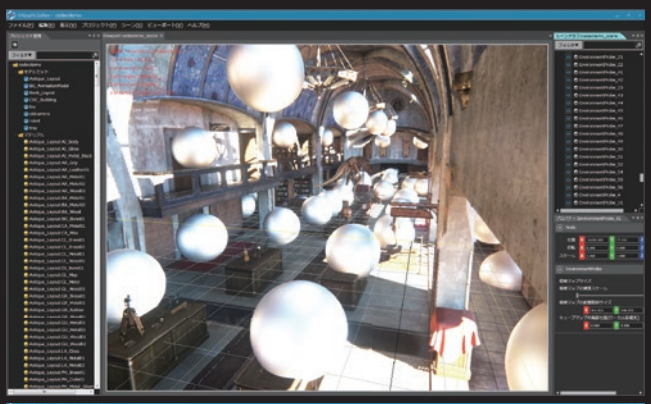
Physical Based Rendering (PBR), allows physically based pre-rendered assets to be migrated to Mizuchi with little effort achieving similar, or superior results in real-time. Produce 3D assets with DCC or other tools and assign materials and animation. Export FBX data to Mizuchi and render. Edit materials, construct scenes, etc. in Mizuchi, and pass the data to your composite tool. With Mizuchi PBR and IBL, produce 3DCG that can be implemented with live action images with little discrepancy.

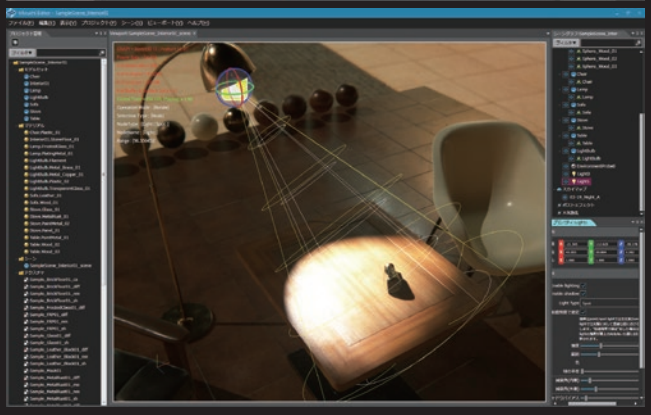


The workflow is divided into material editing, scene construction, and lighting. In the upper example, CG assets created by DCC tools and the data are passed to Mizuchi, where material editing and scene construction are performed. In the lower example, bypass the HDRI panoramic material directly to Mizuchi, and allow the IBL to create the lighting environment. Mizuchi has advanced outputs like color, shadow, etc. corresponding with each frame and can be passed onto the composite tool through multi-path outputs. With full CG or live-action video, Mizuchi can greatly reduce rendering time.

Mizuchi intuitive authoring tool

Mizuchi is composed of two parts, the SDK and the authoring tool or "Mizuchi Editor".
Albedo, normals, glossiness, metalness, and more; Mizuchi Editor can manage a spectrum of rendering parameters through retouching layers, overlapping multiple layers, unmasking layers, and a number of other advanced techniques, such as subsurface scattering (skin), cloth, hair and glass. Not only can you edit the texture of a material but also the state of a material to express special effects, such as scratches, damage, aging, and rust. Also apply various post-effects powered by YEBIS to create various lighting, lens, and field effects in your environment to bring out the best in your materials.





Production support for VR content and real-time CG content

Aside from being a middleware and technology production company, Silicon Studio and its group companies, provide production and content creation for CG, real-time CG and VR content. With nearly 20 years developing CG graphics and related technology for the game and entertainment industries, Silicon Studio has amassed a wealth of know-how and tools of the trade. Producing a number of hit titles and/ or creating graphics and cinematics for big name studios, and recent breakouts in to the non-gaming sector; we are always ready to collaborate and start work on new and exciting projects. If your production team needs assistance, or your company would like to request us to perform production for a project on your behalf, please feel free to contact us.

www.siliconstudio.co.jp/middleware/mizuchi/en

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