

AquaMark3™ "The Reality Benchmark" www.aquamark3.com



Dear Reader!

When we decided to derivate a benchmark tool from our game engine, used in such different titles as the action game AquaNox 2: Revelation [www.aquanox-portal.com] and the RTS game Spellforce [www.spellforce.com], it hasn't been a point of discussion among us that our target was to create a benchmark delivering the most valid and comparable data possible for DirectX 9 gaming - in any kind of 3D game.

We aimed that high because our technology allows us to do exactly that. The krass[™] Engine we developed and which we use for our games is a solid and real world proven middleware layer. Around 90% of all 3D games today are based on similar middleware techniques. For the development of AquaMark3 we could rely on existing game mechanics. We could rely on the simulation system of a released game. We could rely on a physics engine tested in a real world application. We could rely on a technology that allowed us creating and publishing the first DX 8 game ever (AquaNox) in 2001 and the first game ever (AquaNox 2: Revelation) to support Intel's Hyperthread technology and DX 9 in 2002/03. And we could rely on our experiences with AquaMark 2.3, result of a small side project and released to professional hardware testers and IHV in 2001.

So yes, we had the technology. And as gamers we have the knowledge, what gamers need when it comes down to analyzing the gaming system.



Pic 1: Emanating smoke from a factory. Smoke is simulated with a particle system, stressing the graphics card with high overdraw. In the back, buildings with complex materials are shown.



The krass[™] Engine

Here's a short list of some of the most important features included in our game engine. All of these features will be used during the benchmark test be the game simulation running the test scenes.

- DX9 rendering
- rigid-body physics
- flexible-body physic
- outdoor collision systems
- outdoor scene culling system
- particle system

- environmental effect systems
- real-time LOD terrain system
- batch maximization system for particles and plants
- and more...



Pic 2: Large field of underwater plants. The terrain rendering engine can be combined with a plant system, allowing to efficiently render large amounts of plants. The plants are also animated by water movement.

On the rendering side, the engine supports a very flexible material and geometry system which is capable to drive all the newest effects available under the latest DX9 interface. It supports:

- Vertex- and PixelShader 2.0
- large shader constant tables
- floating-point pipeline usage
- HLSL shader implementation
- masked and non masked anti-aliasing modes
- and more...



Different types of benchmarks

In contrast to other more synthetic benchmarking software, the entire code and data base of AquaMark3 is as close to a typical game application as possible. There is basically no code and data inside the game engine which has not been released or has not been proved to be serviceable in released games.

This fact and the general approach of AquaMark3 to serve as "reality benchmark" distinguish AquaMark3 significantly from both synthetic benchmarks and purely game driven tests. AquaMark3 perfectly fills the gap between these two kinds of today's benchmarks.

To measure basic features of your hardware under well and fully defined boundary conditions you may use either a synthetic benchmark or AquaMark3. To get information about your hardware in a general game context which is not too specific for a certain genre, we think AquaMark3 offers the better choice over synthetic benchmarks. If the user is interested in performance data regarding a specific game however, using exactly this game's benchmark (if available) makes perfect sense.

To obtain benchmarking results which are generally applicable to a wide range of customers, any valid public benchmark test should therefore use a larger number of benchmark programs for different objectives.



Pic 3: Complex underwater explosion. The particle system is used to create explosions with many different particle types, including fire, smoke, air bubbles and flying debris.



Pixel Shader Performance

A couple of years ago all you could hear about 3D-gaming sooner or later went towards the problem of geometry. The polygon count seemed to be the entire buzz. These days are over. Geometry calculation isn't the problem anymore. The technology went towards multiple rendering of pixels and this demands different virtues from today's graphics boards. The problem nowadays is the fillrate. How often can the GPU render one pixel, adding layer on layer of graphical effect. Especially with longer pixel shaders, the pixel computation speed quickly becomes a bottleneck.

AquaMark 3 will offer a pixel shader performance test, measuring how many shaded pixels your graphics board has to render for each frame, and the speed at which they are rendered. This unique feature will be completed by a couple of other tests best suited to show you your very gaming reality.

Shaders

AquaMark3 makes heavy use of recent shader technology and includes a total of close to 200 different vertex shaders and 30 pixel shaders. These are used based on the feature of your hardware and the selected quality of effects.

You don't have graphics board capable to support all these cool DirectX 9 features yet? Well, that isn't a problem for AquaMark3 as long as you have installed DirectX 9. The benchmark will automatically use simpler shaders if the high end effects are not available on your system. Because AquaMark3 is based upon a real world game engine it has this technology built in from the beginning. Because of this smart fallback technology AquaMark3 is a tool to benchmark DX7, DX8 and DX9 graphics board hardware!