Case Study:
Dental Assistance Devices
Application Story

CUSTOMER:
White Lion Technologies AG

INDUSTRY:
Medical Imaging

CHALLENGES:
Dental imaging devices require a very high level of processing performance, including massively parallel processing, to enable high-speed 3D graphics rendering. It's also important for processors to be able to handle significant power and cooling challenges.

SOLUTION:
The AMD Embedded G-Series APU provided the optimal balance of processing performance, 3D acceleration, interoperability with back-office IT infrastructure, and power and cooling efficiency.

RESULTS:
Dental-chair 3D visualization is now a reality with White Lion Technologies' dental assistant devices and the AMD Embedded G-Series APU, enabling dentists to provide a cutting-edge care experience for their patients.

AMD TECHNOLOGY AT A GLANCE:
AMD Embedded G-Series APUs

Dental Assistance Device Adopts 3D Visualization with AMD Embedded G-Series APU s

Chair-Side Monitors Provide Clear and Vivid HD Dental Imagery to Help Enhance Diagnoses and Care

Like many technologies in the healthcare domain, the dental assistance device market is moving quickly to embrace 3D visualization at the point of care. Typically, dentists issued diagnoses and treatment recommendations made on the basis of static renderings on conventional 2D x-ray film and light-box illuminators.

Dentists can now have a much clearer view of teeth and gums with a new generation of video- and graphics-optimized touchscreen panels attached to dental chairs, enabling them to diagnose patients with great accuracy. These sleek, chair-side monitors provide 360-degree image visualization and other advanced graphics-driven capabilities in HD resolution with intuitive multi-touch interactivity using tablet computers.

For example, a USB-based intraoral camera attached to the device provides real-time visibility far beyond the coin-sized, one-way reflection of a dentist's mirror. Dentists have the ability to access historical patient data in real-time, manipulating a touchscreen interface in a variety of ways to view diagnostic data from 2D images and 3D CT scans. It is also possible that such a device could also display customer-facing content, such as entertainment programming, educational information and advertisements.

"Dental assistant devices equipped for multimedia and 3D visualization provide new levels of visual details to help patients understand diagnosis and treatment recommendations. As would be expected, these capabilities require a very high level of processing performance. AMD's embedded APUs with a single chip combination of CPU and GPU provide an optimal platform for high-speed parallel processing."

Richard Freitag, White Lion Technologies

When White Lion Technologies AG – a firm focused on research and development for imaging, image processing, software and embedded systems – searched for a processor for its Vision U visual dental assistant devices (available with Ultradent dental chairs), the company chose an AMD Embedded G-Series Accelerated Processing Unit (APU) as the underlying platform. AMD's solution provided the optimal balance of processing performance, 3D acceleration, interoperability with back-office IT infrastructure and patient management systems, and power and cooling efficiency.

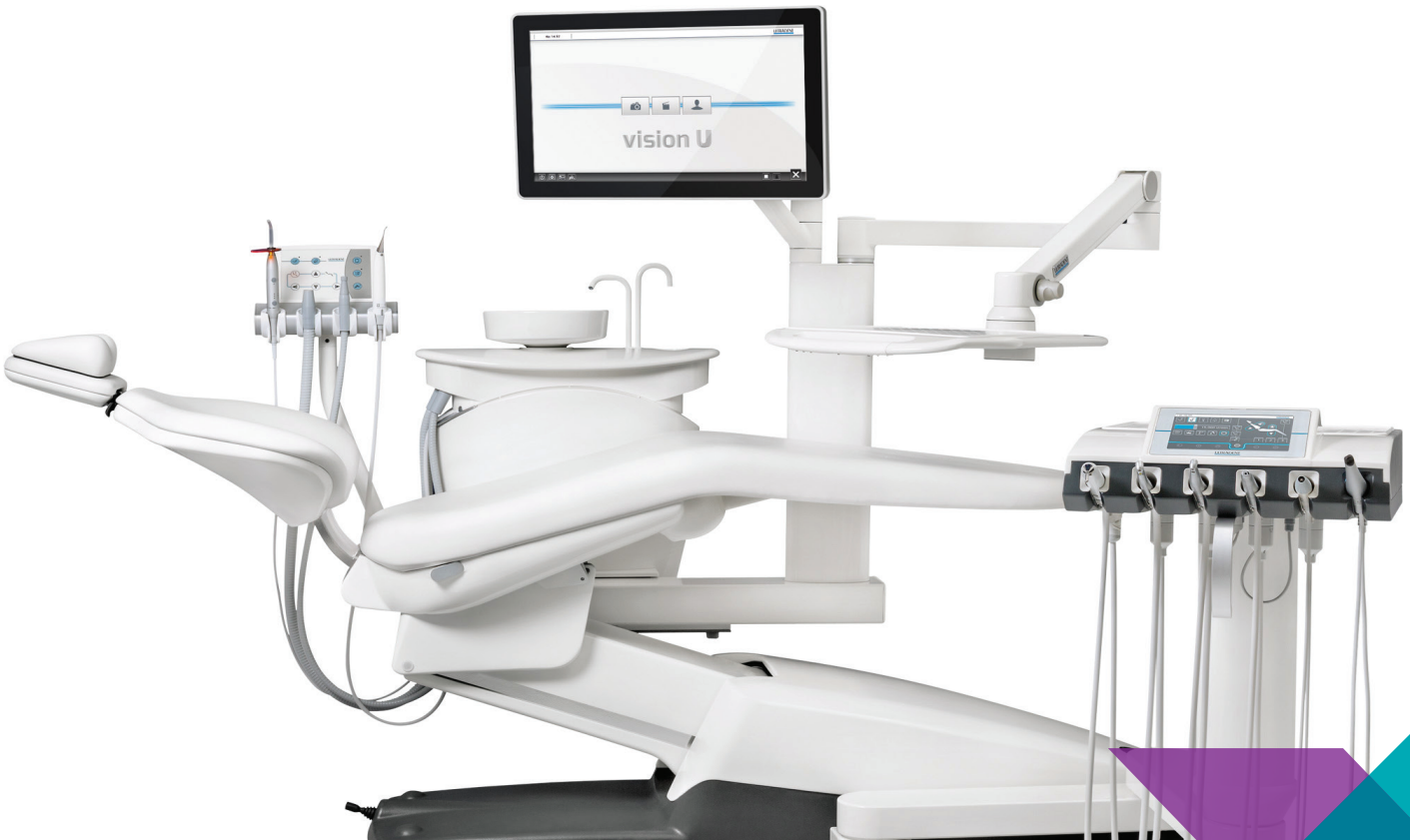
High-speed 3D graphics rendering requires very high level processing performance, including massively parallel processing, to enable 3D visualization-driven medical applications. Additionally, dentist offices present significant power and cooling challenges. AMD embedded APUs are low power, but provide an exceptional platform for high-speed parallel processing.

AMD EMBEDDED G-SERIES APUs

The AMD Embedded G-Series processor was the AMD's first integrated embedded processor to combine a low-power CPU and a discrete-level GPU into a single embedded APU. This unprecedented level of graphics integration builds a new foundation for high-performance, multi-media content delivery in a small form factor and power-efficient platform. The solution is a good fit for medical device solutions such as the Vision U dental assistant device.

The single-chip combination of a CPU and general-purpose GPU (GPGPU) on a single APU maximizes parallel processing throughput. Conventional graphics-integrated chipsets rely on the CPU to interface with the GPU through a North Bridge connection. The conventional serial data processing approach adds memory latency, consumes system power, and sacrifices board space. With an APU architectural approach, however, the CPU performs scalar processing including storage, networking, and memory processing, while simultaneously running the operating system, applications and user interface. Meanwhile, the on-die GPGPU offloads graphics and multimedia processing using SIMD parallel processing. The GPU offloads data parallel from the CPU, freeing it for compute, memory and I/O requests. The APU architecture reduces processing latency and helps improve real-time graphics processing performance.

Support for OpenGL – the computer industry's standard application program interface (API) for defining 2-D and 3-D graphic images –helps enable AMD Embedded G-Series APUs to run sophisticated, massively parallelized algorithms that reconstruct visual representations of digital volume tomography



(DVT) data. As a DVT device records x-ray images through an x-ray tube that rotates around a patient, the APU is used to create images that represent a virtual model of a patient's teeth and jaw structure.

KEEPING IT COOL

Power and cooling efficiencies are critical processing platform requirements for most medical devices as doctors' offices are variable environments. However, due to sanitization requirements, moving parts in machines require regular cleaning. This makes a fanless system preferable to one that requires a fan. In the case of the AMD Embedded G-Series platform, average power consumption is as low as 3.249W[1], which enables a visual dental assistance device to be passively cooled. Besides decreasing cleaning requirements, this decreases the risk of fan failure that can come with cleaning. Visual dental assistance devices based on AMD APUs can make use of sealed display panels to help prevent the ingress of particulates and debris.

SIZE AND SYNERGY

The silicon-level integration of a low-power CPU and discrete-class GPU onto a single APU naturally reduces board space demands and eliminates the need for bulky add-on graphics cards. The slim-profile Vision U visual dental assistance system spans a 21.5 inch HD screen, with a computer module embedded within the rear of the display.

x86-based APUs also help enable dental systems to have smooth interoperability with back-office IT infrastructure and patient record databases and introduce additional benefits for applications including remote system maintenance and administration.

ABOUT WHITE LION TECHNOLOGIES AG

White Lion Technologies develops medical assistance systems (Medical Clinical Assistant MCA) with a special focus on the integration of diagnostic data (eg from new 3D X-ray tomography systems or MRI). Their turnkey solutions begin with the data acquisition and can be seamlessly integrated into clinical practice. They combine cutting-edge research results in easy-to-use systems. To achieve this goal, they have a team of scientists, embedded developers, usability experts and industrial designers who work closely together to develop the best possible system. *For more information, visit http://www.wlt.ag/.*

ABOUT AMD

AMD is a semiconductor design innovator leading the next era of vivid digital experiences with its groundbreaking AMD Accelerated Processing Units (APUs) that power a wide range of computing devices. AMD Embedded Solutions give designers ample flexibility to design scalable, x86- based, low-cost and feature-rich products, and drive energy conservation into their systems without compromising application performance or compatibility, graphics performance or features. *For more information, visit www.amd.com/embedded.*

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1. While running a Winbench 99 business graphics benchmark the AMD G-T16R APU consumed an average of 2.284W. I/O Controller Hub power is estimated based on the measured average power drawn by the I/OCH of .965W during a run of 3DMark 06. System Configuration: AMD G-T16R APU (DVT) at 30°C, "Inagua" Development Board, 4GB 1.35V DDR3, Windows 7 Ultimate. EMB-26