# AUDIOKINETIC SOUNDSEED IMPACT

*Review by Bradley D. Meyer*

**EVERY GENERATION OF CONSOLES** comes with the promise of bigger! Better! Faster! With these new specs comes the desire to add more to every project: more textures, more shaders, more animations, more levels! More! More! MORE! On the audio side we have the call for more streams, more DSP effects, and more variations of sounds. Wrangling memory for these new features is the constant, silent, often violent battle in which we all partake throughout each project. So what if there were a product that could help sound designers resolve at least one of these requests?

## MODAL SYNTHESIS

» Audiokinetic, developer of audio middleware solution Wwise, has released a new family of products called SoundSeed. The company's first entry into this new brand of products, released with Wwise version 2008.4 at the end of last year, is SoundSeed Impact. SoundSeed Impact uses modal synthesis to generate multiple variations of resonant impact sounds using a single reference audio file. Modal synthesis analyzes a waveform and breaks it down into discrete modes, or vibration patterns, and can then recreate sounds by referencing the modal data rather than actual audio data. The end result is a bevy of variations based on one very small source file.

## WORKING WITH IMPACT MODELER

» Two tools comprise SoundSeed Impact: the Impact Modeler and the SoundSeed Impact plug-in for Wwise. The Impact Modeler tool analyzes a wave file and generates a residual noise file consisting of the impact sound with all resonant frequencies stripped out. It generates a text file containing data regarding the frequency, bandwidth, and amplitude of each resonant mode of the original file. The plug-in for Wwise then uses the residual audio file and the resonant modal data to resynthesize the residual file into multiple variations at runtime.

The Impact Modeler (Figure 1) is a standalone application where you import your source file, strip out unnecessary elements, and generate residual files based on the number of modes you desire. The fewer modes you use, the less CPU power you need, but this also lowers the sound quality. The work done in the Impact Modeler optimizes your sound file to give the greatest amount of variation for your sounds, while keeping CPU load manageable.

Using the tool is pretty straightforward and boasts some nice features. It allows you to audition the differences between the original wave, the residual sound, and the resynthesized sound as it will play back in Wwise so you can hear how your sound is changed by the synthesis algorithm and compare your source file to the end result. It also shows a spectrograph of the sound in its varied forms, giving you a visual representation of where the frequencies exist in the residual file versus the original. Fortunately, Audiokinetic has some very helpful movies online that walk you through the process of using the Impact Modeler and explaining the features of this very interesting tool. Once you get the hang of the software, it's a cinch to breeze through making the most efficient, quality-preserving tweaks to your original files. After setting your parameters in the Impact modeler, you save out a new residual wave file, and then import it into Wwise and attach the SoundSeed Impact plug-in to the sound.

### Audiokinetic SOUNDSEED IMPACT

★★★★

**STATS**
Audiokinetic Inc.
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Canada
www.audiokinetic.com

**PRICE**
Initial Platform: $5,000 Additional Platform: $2,500
Additional Maintenance—12 months: $750 (license includes 24 months of support)

**SYSTEM REQUIREMENTS**
Windows XP/Vista, Xbox 360, PlayStation 3 (requires Wwise 2008.4 or later running on PC)

**PROS**
1. Crams a lot of variation into a very small amount of disk space.
2. Interesting use of modal synthesis.
3. Can be used in unique ways for more than just impacts.

**CONS**
1. No Wii support available.
2. Currently requires Wwise as a project's audio engine (which is only bad if you're not already using it).
3. No batch processing available in Impact Modeler.

## PLUG IT IN

» The plug-in side of the software applies the resonant modal data to the residual file and provides several controls to apply variation to the sound (See Figure 2). You can alter the quality of the sound, which determines the number of resonant modes used to generate the resynthesized sound. If CPU is an issue, quality can be cranked down pretty far (50 to 60 percent) and still generate believable sounds, although reducing the modes audibly lowers high frequency detail. You can also tweak the center frequency of each resonant mode (Frequency Stretching), which is most closely related to pitch, or changing the perceived size of an object. Bandwidth Stretching changes the size or width of frequencies for each mode. Adjusting this value will dampen or brighten the sound. Finally, Magnitude Scaling applies an increased or dampened amplitude weight to harmonic content, which Audiokinetic likens to different forces of impact. Frequency, Bandwidth, and Magnitude Scaling can all be randomized by a scale of 0 to 100 percent each time a sound is played, thereby generating a unique variation each time the sound is triggered in the engine. Furthermore, all parameters within the SoundSeed Impact

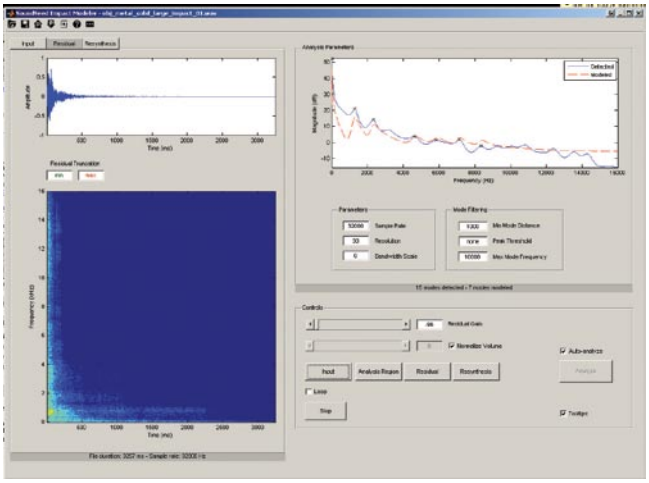

FIGURE 1 **The Impact Modeler is a standalone application for importing sound files into SoundSeed.**

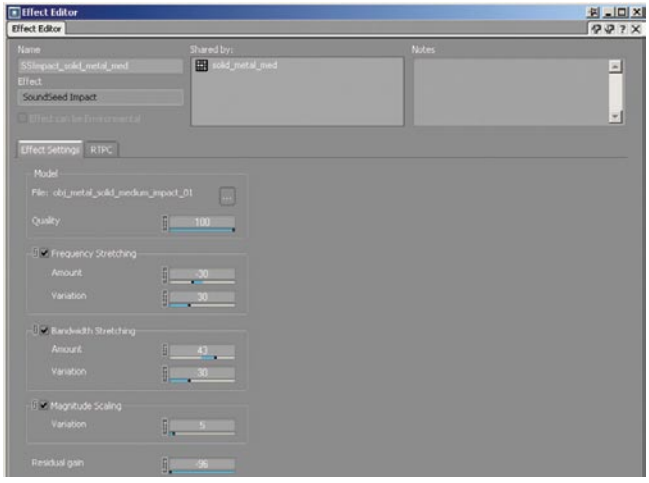


FIGURE 2 **The SoundSeed Impact plug-in provides controls for varying the sound.**

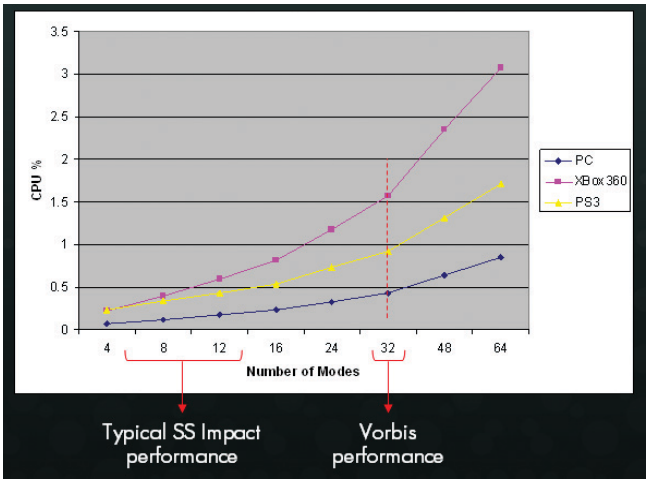


FIGURE 3 **SoundSeed Impact realizes its best performance running on PC CPUs.**

Plug-in can be driven by real-time parameter controls (RTPCs) in the game. Utilizing RTPCs you can reduce quality based on distance, decrease frequency based on the mass of the object, or use any other game parameter to control any setting(s) of a SoundSeed Impact plug-in.

## USING MODAL SYNTHESIS CREATIVELY

» While the synthesis engine is customized to create believable impact sounds, there is nothing preventing you from applying SoundSeed Impact to any sound you like, creating unique variations of any transient (fast attack) sound. I played around with generating non-impact resonant files and mixing these with residual impact sounds, and then mixing and matching resonant models with different residual files and got some unique coloration to sounds. For example, asphalt footsteps were given a huge booming presence when referencing the modal data of a large metal impact. Even more interesting were the variations created on vocal emotes. I was able to generate subtle, believable variants of a single emote that sounded much more natural than subtle pitch variation. A lot of my experiments were not necessarily usable, but mixing and matching sounds and residual models can easily waste hours of a sound designer's life, and sometimes uncover a really unique gem.

## THE LIMITATIONS

» In spite of the distinctive nature of SoundSeed Impact, there are some limitations to its capabilities. It currently cannot handle varying resonant pitches within a residual sound elegantly. So if you're hoping to use this tool to make endless variations of a warbly sheet metal hit, you may be better off taking the old fashioned route and creating multiple variations of the sound itself. In many cases a single variation even using SoundSeed Impact was not quite enough to sustain a believable sound palette, but the sounds created through it were far more realistic sounding than simple pitch or volume variation. The best technique I found was to create a random container with a few residual sounds and apply one SoundSeed Impact plug-in to the parent.

Surprisingly, SoundSeed Impact's performance is better on the PlayStation 3 than the Xbox 360 (and much better still on PC). Expect to use between .2 and .7 percent of one CPU core to handle one instance of the SoundSeed Impact plug-in; a fairly modest load (provided it's used judiciously) considering the amount of variation that can result. (See Figure 3). A final drawback of SoundSeed Impact is that, due to the complex nature of the plug-in architecture and the lack of software DSP support on Nintendo's hardware, it does not support the Wii, which is arguably the platform that would benefit most from a low CPU alternative to loading dozens of variations in memory.

## SONIC VARIETY AT LOW COST

» SoundSeed Impact is an interesting, unique tool that satisfies a sound designer's need to create numerous variations of frequently repetitive sounds. On my test files I saw file size reductions of 30 to 50 percent between the original wave file and the residual file. Combine that with using one to three variations instead of five to nine and you are looking at some impressive disk space and memory savings. Like the rest of Audiokinetic's toolset, SoundSeed Impact is intuitive and easy to use. Audiokinetic has additional products already in development in the SoundSeed family, each of which uses unique forms of synthesis to help designers create other types of sounds in new, creative ways. It will be interesting to watch how this product line grows and what new sprouts we will see from SoundSeed in the future.

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