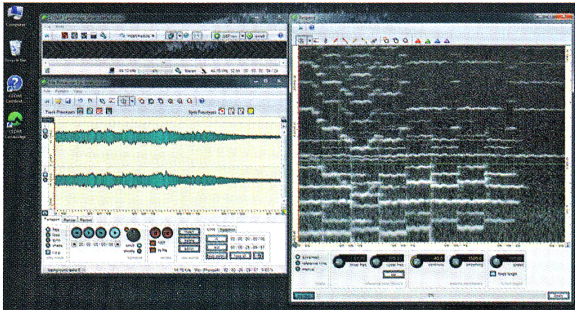


CEDAR Audio Respeed

CEDAR has pioneered many of the most significant innovations in the field of audio restoration. BILL LACEY believes Respeed continues a tradition of excellence.



Speed variations can occur in the playback of analogue devices due to a variety of causes, such as faulty tape transports, glue from tape splices, oxide build-up on capstan motors, and stretched or damaged tape. Analogue recordings may play back at a different speed to the machine they were originally recorded on. Disc transfers can suffer from off-centre holes leading to cyclic speed changes defined as 'wow'. Faulty batteries in portable recording devices may lead to long-term variations in speed. Respeed is the first solution available that can identify and fix an assortment of problems relating to these random variations in the speed of audio. Let's find out how it works.

Respeed looks for speed fluctuations over the entire frequency spectrum. To do so it creates a map of the pitch profile of the track. In addition to pitched elements in the signal, Respeed also considers elements such as mains-related hum, video line scan interference, broadcast pilot tone, and tape bias signals to create an analysis. It even takes the noise floor into consideration. Since any speed changes on playback will affect all of these elements simultaneously, Respeed is able to identify the speed changes and ignore intentional variations created by individual instruments, such as vibrato. A real-time preview of the corrections to be applied is offered. The actual speed corrections are performed by dynamically changing sample rate conversion over time.

Respeed is a plug-in module for Version 7 of CEDAR's flagship restoration workstation, CEDAR Cambridge. Respeed is what CEDAR calls a Track Process, and is accessed within the File Processor in CEDAR Cambridge. Once your audio is loaded into the File Processor, the entire track or a section may be selected for processing. Clicking on the Respeed button opens the module with the audio loaded. As with most of the modules in CEDAR Cambridge, the controls are few and very powerful, making it very easy to achieve acceptable results almost immediately.

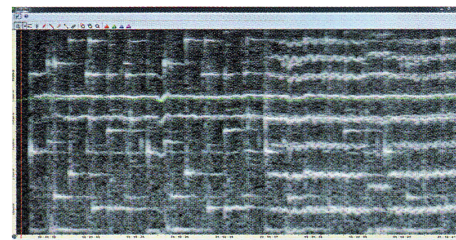
The most prominent feature of Respeed is the monochrome Spectrogram. The horizontal axis represents time, the vertical axis represents frequency and amplitude is represented by pixel intensity (the brighter the pixel, the louder the signal at that point). There is a small wheel in the lower left hand corner of the display that can be dragged upwards or downwards to increase or decrease the intensity of the display, making it easier to identify more or less detail depending on the audio content and your needs. Two indicators appear representing the output speed (a dotted line) and the speed variations that will be applied (a green line). This green line is referred to as

the speed correction template.

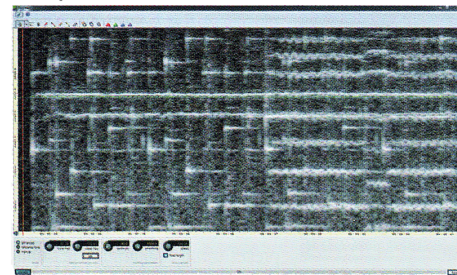
Respeed offers three modes of operation. The Advanced mode is what you'll be working in most of the time. The first step is to zoom in to a suitable level in the Spectrogram to identify what CEDAR refers to as 'wiggles'. These are relatively easy to spot when zoomed in far enough, and you may notice that these wiggles replicate vertically at various frequencies. Clicking on the Preview button instructs Respeed to perform an analysis of the selected audio, and after a few seconds the speed correction template appears. Before proceeding you must instruct Respeed as to whether or not to preserve the length of the source file (important for any film and television work). The module defaults to fixed length. You may then audition the changes and make further adjustments. The primary adjustments come in the form of two controls. The first — Continuity — controls the overall degree of speed corrections that are allowed. At its leftmost setting of -40, the maximum amount of correction is applied. Depending on the source audio, this setting can produce wild leaps in pitch right amount. At its rightmost setting of +40 very little correction is applied. I found that initially a setting of -40 allows for easy identification of any errant analysis and helps make for easy correction with the supplied manual tools, which we'll come to in a moment. The second control — Smoothing — filters the detail of the speed correction template. At its maximum setting of 1500 the speed correction is extremely detailed, while the minimum setting smooths the template dramatically. Depending on the source audio and the degree of speed correction needed, these controls may produce dramatic changes in the resulting audio, or subtle ones.

The second mode of operation is labelled Reference Tone. This mode allows the user to give added weight in the analysis to a specific frequency range, such as a 50Hz mains hum or high frequency pilot tone. As these tones are typically constant, concentrating the analysis on these can be a useful alternative to finding the best correction template. The third mode — Manual — allows the user to draw corrections using anchor points and a clever tool that CEDAR calls Trends. Trends allows the user to influence the overall shape of the speed correction template by suggesting new values. The resulting template retains the detail of the original analysis, but takes into account the new path you have suggested.

I tested many sources with Respeed to determine how well it really worked. A popular pop song I mastered years ago that always had an uncomfortable pitch shift at the beginning of the song surrendered its wiggles. I also transferred an LP and periodically put my finger on the turntable to induce a speed change at a particular point. As you can clearly see in the 'before' of Example 1, the point where I applied pressure to the LP causes a wiggle across

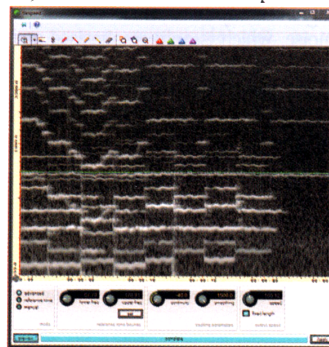


Example 1 – Before.

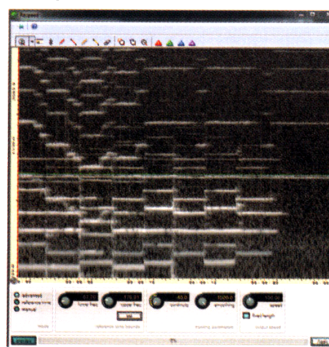


Example 1 – After.

the frequency spectrum, and the speed correction template has correctly identified it (I've used the maximum settings for display purposes). Respeed perfectly corrects the deviation, as you can see in the 'after' of Example 1.



Example 2 – Before.



Example 2 – After.

In Example 2, a disc transfer of a symphonic piece had a severe case of the wiggles. Respeed effortlessly removed them. It's astonishing how well it works.

Respeed is not just for music and spoken word benefits from it as well. I even tried it with tape and disc transfers that appeared to have no speed variations, and Respeed identified areas that would benefit from minor corrections.

I may never look at wiggly lines the same way again. At least I'll no longer have to apologise to clients when they ask me to address a problem that, until the arrival of Respeed, would have been impossible to solve. I can't guarantee that Respeed can fix every problem you throw at it, but if you're serious about your sound and are a CEDAR Cambridge user there is no excuse not to add this to your kit. ■

PROS Stunning results; easy to use; a must have for any serious restoration engineer.

CONS Staring at wiggly lines for long periods may test your sanity.

Contact

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