A Hauptwerk Organ for Gethsemane Lutheran Church by Brooke Benfield
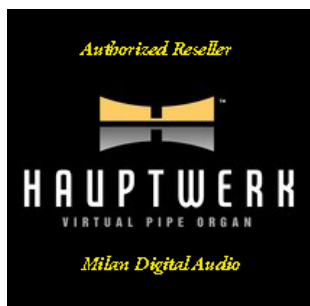
Organtechnology™
Virtual Pipe Organ Systems

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Organtechnology Virtual Pipe Organs

Whether it is the sound from a completely new Hauptwerk based virtual pipe organ or the conversion of an existing console to a Hauptwerk VPO, the sounds you hear are the magnificent sounds of an actual wind blown pipe organ. These are pipe sounds that were meticulously recorded and assembled into a Hauptwerk compatible 'sample set' for use by Hauptwerk software. Because of this, Organtechnology Virtual Pipe Organs sound like, play like and feel like real pipe organs. A wide variety of organ genres can be used with our VPO. English, French, German, American, Theatre and even Harpsichords are all available for the Hauptwerk organ platform. There are organs with large acoustics and organs with small acoustics and custom organs are available. all in the same console.

Created for a chuch in Texas, this Organtechnology™ instrument is built on a Rodgers console from an analog organ. The AGO specification console is three keyboards with programmable[1] thumb pistons, 32 note pedal board, 3 expression pedals and multiple toe-studs. This technology is well suited to a church whose acoustics can accomodate a pipe organ or to a choir room or practice area.

One switch turn on; A hallmark of all Organtechnology VPOs. is one button turn on or turn off. Through the use of Solid State Drives and high speed processors, the boot time for an organ is usually less than 2 minutes. So push one button and by the time you have the bench adjusted and the music out, it's ready to play. After the service, push the same button and the entire organ turns off.

Genre versatility; Change entire organs via piston push, touchscreen touch or mouse clicks. There are up to 32 favorite organs that may be loaded at the touch of a button or the click of a mouse. Eight of these are instantly available via the pistons.

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Organs may be changed to suit the music.
- Play Widor on a Cavaille-Col organ,
- Play Bach on a Schnitger organ
- Play Anglican hymnody on a Father Willis organ.

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Instant recall of memory levels; Memory levels (named registration files) contain all piston and toe stud content as well as 999 general combinations that are selectable using the built-in combination stepper (Setzer). Piston arrangement can be customized as desired American style pistons (General and Divisional) or European style Combination Stepper (Setzer) or both. These 'memory level' files may also be named to individually identify whose combinations they are and these can be stored to disk or thumb drive.

Programmable Pistons and Toe Studs; You decide what virtual piston each physical piston controls and what ranks and couplers are to be stored in the virtual piston. Up to 24 pistons are available per manual piston rail and toe studs can be mounted either on the knee board or a separate bolster.

Floating Divisions; Make three manuals play like 4 or 5. Floating divisions allow you to control more *virtual* keyboards than you have *physical* keyboards and allow you to order how your keyboards are assigned to virtual keyboards in real-time (while playing). You can configure up to five keyboards in this way and flip them dynamically between virtual keyboards with piston presses.

Sound is the thing; When you hear the sounds from an Organtechnology Hauptwerk based VPO, you are hearing the sound of real wind blown pipes that have been individually recorded and assembled into a virtual organ. How convincing this virtual organ is to the listener, that what they are hearing is a pipe organ, depends on the quality of the sound reproduction system.

Each organ sound system supplied by Organtechnology reproduces only the organ sounds and is not part of the church's PA system. This allows the organ to be a stand alone musical instrument, just like a pipe organ and allows the VPO to be voiced to the room on a pipe by pipe basis, like a pipe organ. We encourage the participation of voicers and acousticians to aid in the design and implementation of the sound system because the better the sound system the better the realism.

In churches, auditoriums and other large spaces, Organtechnology uses Dante Audio-over-Ethernet sound systems to carry many channels of audio long distances over a single CAT6 ethernet cable saving the analog cables for the last few feet in the amplifier/speaker rack. All Organtechnology systems for churches have 64 channel ASIO audio technology at the console but exactly how many speakers are used is determined by the needs of the room to produce the frequencies and sound level needed for true pipe organ realism.

The 32-channel Dante digital to analog interface, shown above, can drive up to 32 amplifier/speakers for unparalleled realism.

All of this sound travels over one Cat 6 ethernet cable to the speaker location and then very short analog audio cables to the amplifiers.

For fewer speakers, 4-channel devices convert from Dante digital sound to analog sound at the location of the speakers. Two are sufficient for eight channels. (6 studio monitors and a sub.) Shown here are the unD4O audio modules for just such a small system.

VPO sound is produced by speakers. The more speakers employed, the clearer the sound. This is because of the Hauptwerk Output Allocation Algorithm. The allocation algorithm group setting determines how Hauptwerk will allocate each individual pipe amongst the available logical outputs (amplifiers/speakers) within the group. For example, if a group contains three stereo outputs (6 speakers) and the selected algorithm is 'Cyclic within octave, octaves cycled ', each successive pipe will be assigned to the next available stereo pair until all of the pairs have been assigned a pipe, in order to minimize the chance of any two pipes sounding through the same

pair at the same time. This minimizes speaker intermodulation distortion, and produces a clearer sound. The more pairs available in the output group, the more the sound is spread around producing the clearest sound. All of the speakers and amplifiers in an output group must be identical. In many cases powered loudspeakers are used to minimize the speaker wiring from the amplifier to the speaker and assure that the speakers and amplifiers are matched and identical. The result of this effort is an astonishingly clear and crisp sound from each group. Of course, multiple pairs of speakers can be set in an output group and located in the appropriate location for a pipe organ division, putting these speakers in the former pipe chambers does that.

Put this technology and our expertise together and they produce one fine sounding Hauptwerk Virtual Pipe Organ

Frequently asked questions.

Q. What is a Virtual Pipe Organ anyway ?

A.   A Virtual Pipe Organ is an organ where the sounds of each pipe in the organ being recorded are captured in a high quality digital recording and these WAV files are assembled into a large data file which is then used by the Hauptwerk™ software to re-create the stereo sound field of the original recorded pipe organ as the organist plays the console. This means Hauptwerk™ is a *recorded pipe organ system* rather than a synthesized (digital or analog) organ. This technology allows a realism of organ sound reproduction that was previously not obtainable.

Q. What types of sample sets are available ?

A. Two basic types of sample sets are available:
Dry samples, which are used in large spaces with natural acoustics and on systems where convolution reverb software is employed, have little to no room acoustics recorded with them and depend on the natural reverberation acoustics of the room.

Wet sample sets have all or most of the natural acoustics incorporated in the pipe recordings and thus have natural reverb when played back. These are designed for spaces with little to no acoustic or for headphone use.

Within these two types of sample sets are several genres of organ samples such as; English, American, German, French, Baroque and Romantic. A Hauptwerk based VPO can have any or all of these organs loaded to play at a moments notice.

Q. Can I turn on the instrument like a pipe organ and just play?

A. Yes you can. Under normal conditions the instrument is started with a single push button and stopped with the push of the same or another button. No user intervention is required. An Organtechnology™ VPO can be configured to provide complete control from only the controls of the console (headless), or from the screens.

Q. What about warranty service?

A. For warranty service on a new VPO, our technicians can do a great deal via remote access although if hardware repairs are needed, a return of the defective unit (keyboard, encoder or sound engine) may be necessary. All of the electronic parts used are available on the open market. The computer can be updated, if desired, but once it is installed and working only occasional contact with the internet is necessary, or when remote service calls are needed. For out of warranty repairs or updates a competent PC repair technician may be employed.

Q. How long will a VPO last before it needs replacement?

A. An Organtechnology VPO should last a very long time. Since it is a self contained system using open source components, it should last as long as computer parts are made. Although the sound engine computer is a very powerful one, the future will certainly continue to bring more computer power at lower prices. This means that in the event of a catastropic failure, the entire computer could be replaced with a more powerful machine at a very reasonable price, probably much less than re-leathering.

Q. Once an Organtechnology VPO is installed, can I change it ?

A. You may change many things on your VPO. The easiest to change is the organ sound by changing the organ sample set. These can be changed so easily that many people have several loaded for immediate swap. The next most popular upgrade is multiple touch screens. Convolution Reverberation is another popular addition. This feature is added in software and there are very few hardware changes needed.

Q. Why are there no off-the-shelf Hauptwerk VPOs?

A. The process of specifying the Organtechnology VPO for yourchurch is very much like specifying a pipe organ. Both the organ(s) and the room need to be considered from a physical standpoint and a sound standpoint. Choosing the number of manuals and physical controls on the console is followed bychoosing the organ sample set(s) that best fits the space. Then the sound system to reproduce the chosen organ is calculated to fill the room with sound but not be too loud and the equipment and speaker locations need to be carefully chosen from acoustical and architectural standpoints.

Q. Isn't a VPO just another 'Digital Organ'?

A. The difference between a pipe organ, an analog organ, a digital organ and a virtual pipe organ is in the technology used to produce the sound. The console controls are very similar in all three but the main consideration is the pipe organ sound is the benchmark, with the VPO sound being closest to the mark.

- The pipe organ uses wind-blown pipes of various types and lengths to make the sounds. It produces the sound to which all other organs aspire.

- Hauptwerk based Virtual Pipe Organ uses a technique of digitally recording the sound of each and every note in each rank of the pipe organ multiple times (staccato, medium, long) for precise interaction in its respective acoustic setting. This is a laborious task which can take as much as a year to produce the Sample Set for that pipe organ. However the results are astonishing. When played back on a Hauptwerk equipped sound engine and a sufficiently powerful sound system you have virtually recreated the organ from which the samples were recorded! Hauptwerk compatible sample sets also include the mechanical sounds of the tracker action and keyboard action which takes it up a level in the dimension of realism.

- The Digital organ uses a more efficient sampling method to achieve its sound. Just a few key pipes from each rank are sampled then the other notes are derived (stretched) to fill in the missing notes across the keyboard or pedal compass. In most cases this results in a sterile sound since many notes sound exactly like the previous note just higher or lower. Any character or slight difference in timbre between each pipe of the rank being sampled is lost.

- An analog organ seeks to synthesize sounds similar to pipes by using older electronic circuitry such as oscillators and transistors. The electronic boards are designed in a way to create a wave form with a sound that is sort of like a pipe sound but not quite. Analog organs are our favorite source of 'donor organs' to which we retrofit the Organtechnology electronics and sound engine to make a Hauptwerk™ based VPO. Many of these older analog organ consoles were very well built and used high quality key beds.

If you have questions that are not answered here, please give us a call or drop us an email at 214-908-3850; email: info@organtechnology.com