Audio engineering

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Audio engineering is a skilled trade that deals with the use of machinery and equipment for the recording, mixing and reproduction of sounds. The field draws on many artistic and vocational areas, including electronics, acoustics, psychoacoustics, and music. An audio engineer is proficient with different types of recording media, such as analog tape, digital multitrack recorders and workstations, and computer knowledge. With the advent of the digital age, it is becoming more and more important for the audio engineer to be versed in the understanding of software and hardware integration from synchronization to analog to digital transfers.

Audio engineering concerns the creative and practical aspects of sounds and music, in contrast with the formal engineering discipline known as acoustical engineering. Producer, engineer, mixer Phil Ek has described audio engineering as the "physical recording of any project—the placing of microphones, the turning of pre-amp knobs, the setting of levels—and the producer is the guy who directs that process."[1] Many recording engineers also invented new technology, equipment and techniques, to enhance the process and art.[2]

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Lexical dispute

The expressions "audio engineer" and "sound engineer" are ambiguous. Such terms can refer to a person working in sound and music production, as well as to an engineer with a degree who designs professional equipment for these tasks. The latter profession often develops the tools needed for the former's work. Other languages, such as German and Italian, have different words to refer to these activities. For instance, in German, the *Tontechniker* (audio technician) is the one who operates the audio equipment and the *Tonmeister* (sound master) is a person who creates recordings or broadcasts of music who is both deeply musically trained (in 'classical' and non-classical genres) and who also has a detailed theoretical and practical knowledge of virtually all aspects of sound, whereas the *Toningenieur* (audio engineer) is the one who designs, builds and repairs it.

Individuals who design acoustical simulations of rooms, shaping algorithms for digital signal processing and computer music problems, perform institutional research on sound, and other advanced fields of audio engineering are most often graduates of an accredited college or university, or have passed a difficult civil qualification test.

Certain jurisdictions specifically prohibit the use of the title engineer to any individual not a registered member of the local professional engineering body, responsible for regulating ethics and the safety of the public with respect to the engineering profession, which often may not include audio engineers. In such situations they are formally referred to as audio technicians.

Practitioners

An audio engineer is someone with experience and training in the production and manipulation of sound through mechanical (analog) or digital means. As a professional title, this person is sometimes designated as a sound engineer or recording engineer instead. A person with one of these titles is commonly listed in the credits of many commercial music recordings (as well as in other productions that include sound, such as movies).

An engineer at an audio console.

Audio engineers are generally familiar with the design, installation, and/or operation of sound recording, sound reinforcement, or sound broadcasting equipment, including large and small format consoles. In the recording studio environment, the audio engineer records, edits, manipulates, mixes, and/or masters sound by technical means in order to realize an artist's or record producer's creative vision. While usually associated with music production, an audio engineer deals with sound for a wide range of applications, including post-production for video and film, live sound reinforcement, advertising, multimedia, and broadcasting. When referring to video games, an audio engineer may also be a computer programmer.

In larger productions, an audio engineer is responsible for the technical aspects of a sound recording or other audio production, and works together with a record producer or director, although the engineer's role may also be integrated with that of the producer. In smaller productions and studios the sound engineer and producer is often one and the same person.

In typical sound reinforcement applications, audio engineers often assume the role of producer, making artistic and technical decisions, and sometimes even scheduling and budget decisions.[3]

Different professional branches

There are four distinct steps to commercial production of a recording: Recording, editing, mixing, and mastering. Typically, each is performed by a sound engineer who specializes only in that part of production.

- Studio engineer – an engineer working within a studio facility, either with a producer or independently
- Recording engineer – engineer who records sound.
- Assistant engineer – often employed in larger studios, allowing them to train to become full-time engineers. They often assist full-time engineers with microphone setups, session breakdowns and in some cases, rough mixes.[4]
- Mixing engineer – a person who creates mixes of multi-track recordings. It is not uncommon for a commercial record to be recorded at one studio and later mixed by different engineers in other studios.
- Mastering engineer – typically the person who mixes the final stereo tracks (or sometimes just a few tracks or stems) that the mix engineer produces. The mastering engineer makes any final adjustments to the overall sound of the record in the final step before commercial duplication. Mastering engineers use principles of equalization and compression to affect the coloration of the sound.

- Game audio designer engineer – deals with sound aspects of game development.
- Live sound engineer – a person dealing with live sound reinforcement. This usually includes planning and installation of speakers, cabling and equipment and mixing sound during the show. This may or may not include running the foldback sound. A live/sound reinforcement engineer hears musical material and tries to correlate that sonic experience with system performance. [5]
- Foldback or Monitor engineer – a person running foldback sound during a live event. The term "foldback" is outdated and refers to the practice of folding back audio signals from the FOH (Front of House) mixing console to the stage in order for musicians to hear themselves while performing. Monitor engineers usually have a separate audio system from the FOH engineer and manipulate audio signals independently from what the audience hears, in order to satisfy the requirements of each performer on stage. In-ear systems, digital and analog mixing consoles, and a variety of speaker enclosures are typically used by monitor engineers. In addition most monitor engineers must be familiar with wireless or RF (radio-frequency) equipment and must interface personally with the artist(s) during each performance.
- Systems engineer – responsible for the design setup of modern PA systems which are often very complex. A systems engineer is usually also referred to as a "crew chief" on tour and is responsible for the performance and day-to-day job requirements of the audio crew as a whole along with the FOH audio system.
- Audio post engineer – a person who edits and mixes audio for film and/or television.

Education

Audio engineers come from backgrounds such as fine arts, broadcasting, music or electronics. Many colleges and accredited institutions around the world offer degrees in audio engineering, such as a BS in audio production. The University of Miami's Frost School of Music was the first university in the United States to offer a four-year Bachelor of Music degree in Music Engineering Technology. In the last 25 years, some contemporary music schools have initiated audio engineering programs, usually awarding a Bachelor of Music degree to graduates. Additionally, a number of audio engineers are autodidacts with no formal training.

Correcting a room's frequency response.
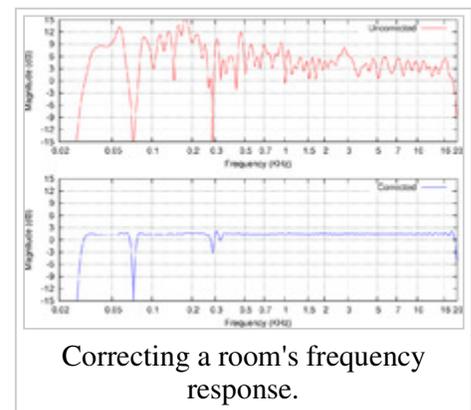
Equipment

Audio engineers in their daily work operate and make use of:

- Mixing consoles
- Microphones
- Signal processors
- Analog-to-digital converters
- Tape machines
- Digital audio workstations
- Music sequencers
- Digital-to-analog converters
- Loudspeakers
- Preamplifiers
- Amplifiers
- Dynamic range compression

Recording engineers of note

Mastering engineers of note

Live sound engineers of note

See also

- Sound recording
- History of sound recording
- Audio Engineering Society
- Institute of Broadcast Sound
- Production engineer
- Sound designer

- Sound operator
- Recording studio
- Electrical engineering
- Acoustical engineering
- Broadcast engineering
- Live sound mixing

- Record producer
- Professional audio
- Audio restoration
- Needle drop
- PLASA
- Enhanced Acoustic Simulator for Engineers

External resources

- Audio Engineering Society (http://www.aes.org/)
- Audio engineering formulas and calculators (http://www.sengpielaudio.com/Calculations03.htm)
- Recording engineer video interviews (http://www.recordproduction.com/producers_and_engineers.htm)
- A free collection of online audio tools for audio engineers (http://www.audiocheck.net)
- WikiRecording's Audio Engineer Directory (http://www.wikirecording.org/Recording_Engineers)
- Audio Engineering online course (http://www.audiosonica.com/en/course/post/2) under Creative Commons Licence
- Audio White Papers, Articles and Books (http://ap.com/download/whitepapers)
- Rane Pro Audio Reference (http://www.rane.com/digi-dic.html)

References

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3. **^** Huber, D.M. (1995). *Modern Recording Techniques*. (5th ed.). Burlington, MA: Focal Press
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