City Talk

It's been a revolution with the gramophone, the hi-fi sound system and digital Walkman.

TECHNOLOGY THAT LED TO A GROOVIER AGE

Nuts and bolts

Edmund Leung

Not many of us can afford to enjoy music in a concert hall.

Thanks to Thomas Edison's invention of phonography in the late 19th century, sound recording and playing back became possible.

The earliest phonographs were in the form of wax cylinders. which were hard to store and duplicate.

As such, wax cylinders were soon superseded by vinyl discs, which could be mass produced and easily played on the gramophone.

Suddenly, ordinary people were able to select music to enjoy at home at their leisure.

This early type of sound recording was made possible by indenting the frequency and the tones of the sound by cutting accurately a groove in shapes and depths that correspond to the sound wave.

This groove forms a continuous spiral all the way from the outer perimeter to the center on one side of the disc.

When the disc is rotated on a turntable at a predefined speed, a hard stylus rubbing on the groove vibrates to reproduce the sound wave. The sound wave is then amplified by a long horn-shaped loudspeaker to a volume that is audible.

The limitation of such a rudimentary system is in the accuracy of the indentations in the rotating disc, the short life of the disc resulting from excessive wear of the groove by the stylus, and the ability to amplify the sound for easy listening.

With improving technology, the indentations became more and more accurate. Apart from closely resembling the original sound, the rotating speed can be reduced from 78 revolutions per minute to 45 and then the long-playing 33 rpm that enabled music to be delivered at up to 30 minutes on either side of a record.

Advancements in electronic technology also allowed a far larger amplification in sound magnitude.

This not only enabled the recorded music to be heard in larger rooms but also helped reduce wear in the record with a lighter stylus pick-up device. This explains why the gramophone record system was able to maintain its popularity for over a century.

Further developments saw physical grooves replaced by magnetic signals stored in discs and then tapes.

This facilitated the more accurate recording of the sound and provided a far larger storage capacity.

Music quality now has a far higher fidelity, closely resembling the original sound characteristics, and the modern hi-fi system became available to home music lovers.

Large rolls of magnetic tapes were soon supplemented and replaced by small cassette tapes that were much easier to handle and transport and led to music being heard outside homes through a hand-held device called the Walkman.

But magnetic storage has its limitations. It can be affected by external magnetic forces and the ferrous coating on the tapes may deteriorate with age and with continuous playing.

The arrival of the digital age completely revolutionized recordings.

Sound waves are converted into compact digital signals that can be stored without distortion in computers, CD or other laser discs, USBs or even on cloud platforms, making them available on demand.

Compared to vinyl records and magnetic tapes, they are much easier and flexible to store and handle and allow far more accurate music reproduction.

Continuous developments in technology helps the community not only in our everyday essentials, but also in leisure and enjoyment.

Veteran engineer Edmund Leung Kwong-ho casts an expert eye and ear over features and forces in modern life