

The Pre-mastering Process

Pre-mastering (or mastering as it is more commonly known), is a method of levelling, finishing and coding audio projects so they are suitable for a particular reproduction media format, be it CD, DVD, Vinyl, Compact Cassette or whatever. If you hire a mastering engineer to work on your songs, at the end of the process they will be able to give you (or the factory) a finished 'master' copy of the project in a format which is ideal for the manufacturing plant. The glass master used by the factory to make its pressing parts will be an exact replica of this copy, so getting it right is important.

Initially, the mastering engineer's job was created because the vinyl could only cope with audio that had a certain dynamic range, so it was necessary to employ someone who understood the limitations of the format to tailor the audio before cutting the master disc. Audio on records is encoded as a series of concentric grooves through which the stylus has to travel: too much bass, or a great deal of out-of-phase bass, will cause the needle to jump, so the mastering engineer restricts bass levels and sorts out phase problems. Vinyl also has limitations when it comes to dealing with high frequencies. Too much hi-end tends to result in distortion, so, once again, pre-mastering takes it to a safe level.

Compared to vinyl, mastering for CD is a relatively simple process because the format doesn't impose quite the same high and low frequency restrictions, and there aren't the technical difficulties associated with operating disc cutting lathes. Nevertheless, the engineer still has to do a lot of work to tame and optimise the audio if they are to get the best from the medium, so it's not unusual to get different vinyl and CD masters of the same material.

Song-to-song Consistency

A large part of the mastering engineer's job is to ensure that the project is consistent throughout its duration. It's not a good idea to have one song that audibly leaps out from the rest, for example, only for the next one to sound weak and distant in comparison. It takes a lot of skill and the right equipment to get tracks to have the same apparent 'loudness'. The level meters may show one song as being louder than another, but that doesn't necessarily mean that they sound the same!

Most CD releases are designed to feel as loud as possible; however, it's not possible for a CD to produce signals above standard digital threshold of 0dB. If a track has too much level its waveform will be clipped or truncated above 0dB resulting in nasty digital distortion. Songs that build as they progress can only peak at 0dB, so they are likely to start at a much lower level. This often results in one song sounding very quiet next to another – and that is not particularly good for pop music. To combat the problem, and even out the differences, the engineer applies 'compression' or 'limiting' to the signal. This process dynamically boosts the level of the quieter passages while limiting the louder parts and, when done effectively, makes everything on the CD sit together comfortably without clipping.

Not only does a good mastering engineer have the know how to limit the material while still leaving it sounding fresh and natural, they will also possess a variety of analogue and digital signal processors, and some sophisticated metering, designed specifically for the job.

Law Of Averages

Mastering engineers always work to the law of averages, so that the finished product will sound fine on the majority of equipment. A badly mastered project might sound great on a few systems, but it could appear thin and weak or dull and boomy on others. A good master will please the majority of the listeners and should translate reasonably well to any system.

Radio Friendly Mastering

The aim for most recording artists is to get air play for their music, so it is important to have a recording that sounds its best on radio. Compared to a hi-fi system, FM radio has a limited band-width so broadcasters aggressively compress all their output as a matter of course. Doing this also ensures that the broadcast will translate well on small portable radios, which is what most people have in their homes or listen to at work. As you'd expect, mastering engineers know what to do to a track to ensure that its dynamics and drive will not be destroyed when passed through the broadcaster's compressors, and in some cases they're called upon to produce special radio edits to suit the medium.

Mastering engineers can also be asked to define the start and end points of each song by introducing the coding required for CD players to read the discs properly (these are called PQ codes), to tweak the gaps between songs, adjust fades, and add ISRCs if necessary.

In case you're unfamiliar with them, ISRCs (International Standard Recording Codes) can be assigned to each and every mix of a song and then encoded onto the finished CDs. Once a track has its own a unique code, royalty collection organisations will be able to find out if the song has been broadcast or commercially exploited, and that allows them to pay out to artists, performers, songwriters and labels. In the UK, the PPL (Phonographic Performance Limited) are responsible for assigning ISRCs. They can be contacted via their website at www.ppluk.com or called on 020 7534 1000. Media Sourcing will add your ISRC's automatically, provided they are included in the master.

Can I Master My Own Release?

If you've been recording and mixing your own album or single, you may be tempted to have a go at mastering it yourself, particularly if you have a PC or Mac loaded with one of the affordable mastering software packages that are now on the market. Indeed, it is perfectly possible to get a good result from the DIY approach, especially as many programs offer a range of cleverly calibrated presets to choose from, but having a professional take care of this part of the process is often the thing that transforms a home recording into a professional-sounding release.

Unless a room is properly calibrated and acoustically treated, you can never be certain that your home-grown mastering work will be effective on other systems. In an untreated room some frequencies may combine, while others could partially cancel each other out, forming peaks and troughs in the audio spectrum. These uneven acoustic conditions usually result in mixes being boosted or cut too much in certain frequency bands. If these kinds of mistakes are made during a mixing session, a good mastering engineer can be expected to rectify them in their acoustically neutral studio. It's worth noting that by doing the mastering yourself you could potentially exacerbate any problems further.

The one real advantage of home mastering is that it can save a little money. For the price of a CD album mastering session, some fairly reasonable mastering software can be purchased, although you've still got to learn to use it, and it won't be able to replace professional hardware equipment. Leading the way on the PC is Steinberg's Wavelab 5, which now allows DVD authoring for surround sound as well as standard stereo file editing and mastering. Also popular are IK Multimedia T-racks for both PC and Mac, and SEKD Samplitude 2496 for PC.

The Formats

Before manufacturing can go ahead the factory has to receive the finished product in a format which is compatible with their setup. The most widely accepted professional format is currently the Disc Description Protocol, better known as DDP, which is almost always saved onto 8mm Exabyte tape. Other pro formats include PCM-1630 saved to 1/2 inch video cassette and Sony PCM-9000 optical discs, although these are rarely used nowadays. (Media Sourcing accept all of the most commonly used formats of today, including CD-R, DAT, Exabyte, DLT and DVDR, whether professionally mastered or not).

Nowadays it is common to send the manufacturer a CD-R master, although this is a less reliable format than DDP Exabyte because of its increased data error rate. Different plants have different criteria for error rate acceptability, and it is not unheard of for masters prepared on cheap CD-R burners to be rejected by the factory! Therefore, even if CD-R is the media of choice, the burning process still needs to be done using reliable, good-quality equipment if problems are to be avoided. Having said that, a very high number of masters are supplied to Media Sourcing in this way and the proper checks are in place to ensure you will be told about any problems. Nevertheless, it's not a bad idea to provide a backup copy of the master in case the first one fails or is damaged in transit.

If you are intending to do it at home, an album master must be made in disc-at-once mode. In other words it has to be written in one continuous pass, including all the sub-coding (PQ) information required to determine the start points and end positions of each and every track, and any ISRCs that have been obtained from the PPL.

Choosing A Mastering Engineer

There are hundreds of mastering engineers working across the UK, often operating as part of a mastering house. It should be possible to find a good local company with experienced staff wherever you are living, although Media Sourcing do have the facility to organise this for you, so just ask.

It is generally advisable to find someone local so that you can attend the session itself. This allows you to specify gaps, fades and edits and it gives you the opportunity to take along some reference tracks which will provide the engineer with some more clues as to what sort of sound you are after.

If time is tight and you can't get there in person then there are now companies who allow files to be sent for mastering via the Internet. The e-masters (www.emasters.co.uk) are one such example.

One thing to watch out for is that some mastering houses charge extra for Exabyte tapes and reference copies, adding considerably to the overall bill. If there are additional media costs, manufacturing from CD-R is likely to be a cheaper alternative, although some mastering engineers believe that the CDs manufactured from an Exabyte sound superior.

As with many situations, it often comes down to individual budgets. Pre-mastering is a process which can cost hundreds or tens of thousands of pounds! So decide what's right for you, and ask Media Sourcing for help if you need it.