MAKING VINYL

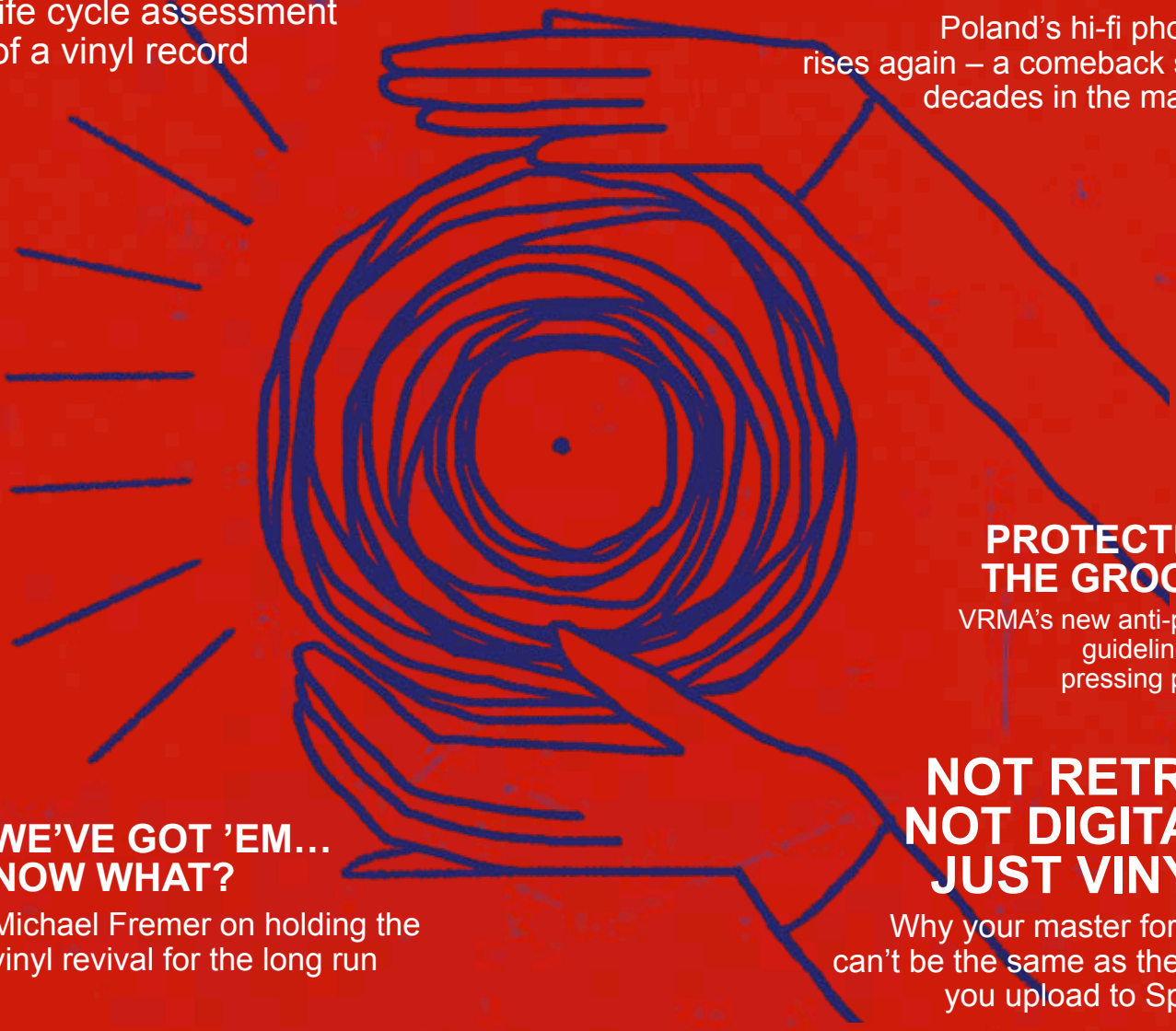
FALL 2025

SUSTAINABILITY BREAKTHROUGH

GZ releases the industry's first life cycle assessment of a vinyl record

UNITRA'S RETURN

Poland's hi-fi phoenix rises again – a comeback story decades in the making



PROTECTING THE GROOVE

VRMA's new anti-piracy guidelines for pressing plants

NOT RETRO. NOT DIGITAL. JUST VINYL.

Why your master for wax can't be the same as the one you upload to Spotify

WE'VE GOT 'EM… NOW WHAT?

Michael Fremer on holding the vinyl revival for the long run

SHAPING THE FUTURE OF VINYL

At the crossroads of culture & craft – inside the next chapter of our industry

MAKING VINYL EUROPE 2025
OUR SPONSORS

PLATINUM SPONSORS

CAF SRL & CAF NA

PLASTCHEM

GOLD & PREMIUM SPONSORS

conectiv

HIGH END SOCIETY

PHEENIX ALPHA

PRESSING BUSINESS

SILVER & PREMIUM SPONSORS

Westlake Global Compounds™

Tullis Russell HIGH PERFORMANCE COATING

SIBERT INSTRUMENTS

BRONZE SPONSORS

GRANULAT2000® wissen schafft kunststoff

iba hartmann LOGO

M-Tech Engineering

RTM

STAMPER DISCS

UNITRA

YES VINYL INNER SLEEVES

HOMETOWN SPONSOR

RECORD INDUSTRY Europe's vinyl pressing plant

PRINT SPONSOR

StyleMathôt DÉ DRUKKERIJ MET EEN eigen stijl

MEET & GREET SPONSOR

KEY PRODUCTION Group of Companies

WELCOME TO

MAKING VINYL EUROPE 2025

PHIL Haarlem,
The Netherlands

CONTENTS

Imprint
Published by: Making Vinyl, Fall 2025
Editor-in-Chief: Andreas Kohl
Design/Layout: Studio Krause
Printed by: StyleMathôt, Haarlem

AT THE CROSSROADS OF CULTURE & CRAFT
SHAPING THE FUTURE OF VINYL

*By **Andreas Kohl** (MVE Conference Director) **& Bryan Ekus** (MV President)*

Dear Friends and Colleagues,

It is with immense pride and heartfelt enthusiasm that we welcome you to this year's Making Vinyl Europe Conference – a unique gathering of visionaries, craftsmen, innovators, and passionate advocates dedicated to the art, science, and future of vinyl manufacturing.

Once again, we want to celebrate creative vision, painstakingly sculpted in files or on tape, dragged through magnetic coils and hot metal to emerge in a form that spins, crackles, and glows with warmth in the moment the intangible becomes tangible.

In the age of high-definition streaming and algorithmic perfection, vinyl has staged an improbable return not in spite of its flaws, but because of them. People crave texture. They crave the ritual of dropping a needle, the arc of an album, the tactile connection to sound.

Vinyl is more than just a medium for music; it is a cultural beacon that connects generations, evokes deep emotions, and preserves moments in time. Each record pressed, each groove carved, is a testament to creativity, craftsmanship, and the timeless human desire to share stories and emotions through sound. The vibrant hum of a turntable is a soundscape of memories, artistry, and shared experiences that transcend borders and generations.

At the heart of this conference lies a shared commitment: to bring our diverse industry together – not only to celebrate what vinyl has accomplished but to envision and shape what lies ahead. As the world changes rapidly around us, we stand at a crossroads where tradition meets innovation, where craftsmanship meets technology, and where our responsibility to the planet and our survival as a species meet our passion for music.

This moment calls for collaboration. Our industry is uniquely positioned to lead the way in sustainability – not just as a noble ideal, but as an urgent necessity. Together, we will explore new materials, innovative manufacturing processes, and eco-conscious standards that reduce environmental impact while maintaining the exceptional quality and rich sensory experience that vinyl lovers cherish. Our goal is clear: to create a future for vinyl production, preserving both our craft and our planet for generations to come.

But sustainability alone is not enough. The Making Vinyl Conference is also about forging new alliances – across continents, companies, and disciplines – that can elevate our industry's standards and practices to new heights. Here in the PHIL in Haarlem, connections will be made, partnerships will form, and ideas will spark collaborations that ripple out across the globe. It is through these bonds that we will build a stronger, more resilient industry capable of thriving in an ever-evolving cultural and economic landscape.

Vinyl manufacturing is a business; it is a vital contributor to society and the economy. It creates meaningful jobs, supports local communities, and fuels creativity in countless forms. Every record pressed sustains an ecosystem – from the engineers who fine-tune machines, to the artists whose music inspires millions, to the retailers who bring vinyl into the hands of passionate listeners. Our work preserves a cultural heritage that enriches lives and fosters a deeper appreciation of music as an art form.

In embracing this mission, we honor the emotional value that vinyl carries - the tactile joy of holding an album, the ritual of placing the needle, and the warm, analog sound. By advancing our industry thoughtfully and sustainably, we ensure that these moments continue to resonate, inspiring future generations to discover the magic of vinyl.

As you navigate this program, we invite you to immerse yourself in the conversations, workshops, and presentations that will challenge, inspire, and empower you. Together, we will confront the challenges ahead, celebrate our shared heritage, and co-create a future where vinyl not only survives but flourishes, both as a cultural treasure and an innovative industry.

Thank you for being part of this extraordinary journey. Your presence here is a testament to your commitment and belief in the power of vinyl to unite us, enrich our communities, and carry the soundtrack of life forward.

Welcome to Making Vinyl. Together, we press forward into the future.

Now let's drop the needle and get to work!

Andreas Kohl, Bryan Ekus
& MVE team!

LEADING THE WAY FOR A BETTER WORLD TOMORROW

VINYL RECORD COMPOUNDS

BY PLASTCHEM

NEW SPARKLE COLOURS

SUSTAINABILITY REPORT

PLASTCHEM CIRCULAR SOLUTIONS

NEW R&D CENTRE

THE ITALIAN COMPOUNDS FOR VINYL RECORDS

MAUFACTURERS OF THE WORLDWIDE FAMOUS HF BLACK.

HIGH QUALITY, HIGH EFFICENCY

108 COLOURS ALSO AVAILABLE

TO KNOW MORE ABOUT OUR FRESHLY SQUEEZED COLOURS

PRESTAMPA@CAFSRL.COM

YOU CAN FIND US AT HAARLEM VINYL FESTIVAL
ON 26, 27, 28 of SEPTEMBER 2025

Info & orders: **info@cafsrl.com** - *Updated Digital Catalogue and colors requests:* **prestampa@cafsrl.com**

CAF srl, Milan, Italy & CAF North America, Norfolk, USA

New Distribution Warehouses in Houston, TX & Chicago, IL

CULTIVATING A COMMUNITY: ONE RECORD AT A TIME

*By **Ruben Planting***

Throughout my career in vinyl, I've been blessed enough to work with the best and for the best. Even my last name has somehow decided my fate. So when one door closed, another one opened, and that's exactly what happened to me last year.

I've always kept my eyes open and constantly look out for new innovations, new companies, and new opportunities to work with or for. Over the past few years, I've had the privilege of visiting more than 25 pressing plants around the world. From small independent factories to full-scale industrial operations – all unique, all proud, all pushing boundaries in their own way. In the end, we're all working with plastic and paper, but how we do it, how we innovate, how we bring people and stories together – that's what makes the difference.

When Bryan Ekus from Making Vinyl reached out earlier this year to start collaborating, I was genuinely surprised and deeply humbled. For many years, I've tried to broaden the horizon of what Making Vinyl could be: bringing in more press, getting more record labels involved, setting up collaborations with other events and conferences across the globe. Why? Because I believe this industry needs bridges. Between creators and manufacturers. Between ideas and execution. Between tradition and innovation.

The product we love is made possible by a group of passionate, skilled people who often stay behind the scenes. It's time to bring them forward. Time to share knowledge, shine light on craftsmanship, and give a stage to those who make this industry what it is.

In the coming editions, Making Vinyl will evolve. We will head in new directions and expand to new locations. But we will never forget what drives us: the people and the product. We want to make the conference more inclusive – inviting more vendors, suppliers, pressing plants, labels, artists, festivals, journalists, and other industry stakeholders to join the conversation. We'll work hard to build a bigger, stronger, more connected vinyl ecosystem.

Research & development will play a larger role in the evolution of our industry, from more intelligent workflows to new materials and more efficient processes. Innovation is not just a buzzword, it's becoming a necessity. At the same time, sustainability is no longer an optional consideration. We need to rethink how we produce, package, and especially distribute records with the future in mind. Topics like circularity, carbon reduction, and energy efficiency are taking center stage. These themes – innovation, sustainability, and meaningful collaboration – will be key pillars in the next chapters of Making Vinyl.

I'm here to listen to your feedback, represent your voices, and help shape the direction we take together. Thank you – from the deepest of my heart – for being part of this. Thank you for joining us these few days in the country where I grew up, and thank you for your continued energy and love for what we all do.

Let's build, let's grow, and let's keep the needle moving.

With love and the utmost respect,

Ruben Martijn Planting
(Assistant Program Manager – Making Vinyl)

REGENERATIVE FUTURES FOR PHYSICAL MEDIA

*By **Tom Moran***

In a world dominated by digital convenience, physical music is quietly making a comeback. It's not just a format, but a force for sustainability, creativity, and cultural depth. Meanwhile, many in the industry are questioning not only the value of streaming platforms but also their values.

A picture from the authors recent trip to Japan. Listening bars are a growing phenomenon there, offering customers the chance to socialise (quietly) while hearing music played on vinyl through world class, audiophile sound systems.

Tom visited listening bars in Kyoto, Hiroshima, Osaka and this one called "The Music Bar Cave" in central Tokyo, where they played one of his favorites, Blue Lines, by Massive Attack.

For a generation that were born wearing headphones, many are seeking new ways to experience music and listening bars are also starting to become more popular in Europe and the US.

To kickstart this years Making Vinyl event, we're hosting a special workshop that will explore the idea of physical music leading the way in making the music industry more sustainable – economically, culturally, and ecologically.

Most digital music platforms are based on a business model that depends on low artist compensation for all but those at the very top of the market. It is also unclear to most consumers what the environmental impacts of digital infrastructure really are. Physical formats offer an alternative that is tangible, collectable, emotional, and maybe most importantly, economically viable for artists.

In our digital driven world, where large platforms reshape society, often favouring the interests of corporations over individuals, making vinyl could be considered an anachronism. But it is also possible that the resurgence of physical media is indicative of a larger societal change. One where younger generations seek out products and experiences that align with their own values.

Like much of society, music has become stratified into a small top layer of incredible success and wealth, and a massive bottom layer of people who make music out of passion, and work another job to support themselves. Maybe the ever-shrinking middle layer of people making a decent living doing something they love is worth protecting as a sort of musical middle class?

Physical media represents both a return to a more equitable economic model as well as a means to encourage more mindful consumption and more meaningful engagement between artists and fans. New models for circular design and low carbon materials are also creating exciting opportunities to rethink packaged media.

Over the past few months, I've had conversations with organisers about the future of Making Vinyl, and it's become clear that we share a vision and passion for sustaining music, while also making physical media more sustainable. While records and physical goods do have negative externalities like material waste and pollution, how do we compare the infrastructure impacts from streaming and digital consumption? I've been researching this question and others like it for the past few years, and I'd like to share what I've learned in this workshop as an impetus to exploring where we go from here.

We'll begin with some thought-provoking facts, but this isn't a presentation. It's a participatory session using systems and design thinking to surface shared values and visions for the music industry's future. From there, we'll define the leverage points available to us and begin develop and conceptualise truly sustainable music products. This isn't just a talk; it's a collaborative design space that will spark creativity and reignite your passion for working in the music business.

As lovers of music seeking to make a living from it, we must consider our role in shaping a more sustainable music industry. How can we use physical music products to move society in a more environmentally, socially, and economically responsible direction? If these are questions that resonate with you, then please join our workshop. It's a great opportunity to explore these big ideas with your peers and kickstart your Making Vinyl experience.

CONFERENCE SCHEDULE

Making Vinyl Europe 2025

WEDNESDAY
September 24, 2025

12:00 pm - 3:00 pm
Factory Tours of Record Industry

2:00 pm - 5:00 pm
EARLY CHECK IN & REGISTRATION

3:00 pm - 5:30 pm – Van Beinum Zaal
Start Making Sense:
Regenerative Futures for Physical Media
Moderator: Tom Moran
Speaker: Stefan Weil

7:00 pm - 10:00 pm
Meet & Greet
Networking LIMITED
at Brasserie Van Beinum

Drinks sponsored by:
KEY PRODUCTION Group of Companies

THURSDAY
September 25, 2025

From 8:00 am
CHECK IN & REGISTRATION

9:00 am - 9:10 am – Kleine Zaal
Welcome from the Organizers
Speakers: Anouk Rijnders, Bryan Ekus, Andreas Kohl, Ruben Planting

9:10 am - 9:50 am – Kleine Zaal
PANEL
Live a Little – The Future of Vinyl (The Manufacturers)
Moderator: Ruben Planting
Speakers: Olga Pilch, Ton Vermeulen, Ian Gowans, Cash Carter

9:50 am - 10:40 am – Kleine Zaal
PANEL
A Hard Days Night – The Future of Vinyl (The Labels)
Moderator: Andreas Kohl
Speakers: Geoff Sadler, Caroline Hansen, Marianne Frederick, Stine Mühle, Sean Preston

10:40 am - 11:05 am
COFFEE AND NETWORKING BREAK

11:00 am - 11:15 am – Van Beinum Zaal
THE MAKING VINYL LAB
Signal to Groove: The Craft and History of Vinyl Mastering
Speakers: Barry Grint, Stefan Betke

11:05 am - 11:20 am – Kleine Zaal
PRESENTATION
The VRMA Anti-Piracy Group
Speaker: Greg Schoener

11:15 am - 11:30 am – Van Beinum Zaal
THE MAKING VINYL LAB
Groove Control – The Evolving Role of Computers in Vinyl Cutting
Speaker: Andreas Wagner

11:20 am - 12:00 pm – Kleine Zaal
PANEL
Stand in the Light – Music Promotion and Marketing in a Digital Age
Moderator: Ronny Krieger
Speakers: Maurice Dharampal, Lennart Brauwers, Alex Bruh

11:30 am - 12:30 pm – Van Beinum Zaal
THE MAKING VINYL LAB
Vinyl Ready Master? A Practical Guide for Labels, Artists & DIY Producers
Moderators: Helmut Erler, Andreas Lubich, Jeff Powell

12:00 pm - 12:15 pm – Kleine Zaal
PRESENTATION
The Vinyl Alliance presents Wax Works – Connecting Vinyl Production with a New Generation
Speakers: Thorsten Megow, Edward Forth, Ryan Mitrovich

12:15 pm - 12:30 pm – Kleine Zaal
PRESENTATION
EMIL – The German Award for Independent Record Stores. More Than a Gesture to Keep Record Stores Alive
Speaker: Karen Laube

12:30 pm - 1:30 pm
LUNCH BREAK

1:30 pm - 1:45 pm – Kleine Zaal
PRESENTATION
IFPI – The Global Recorded Music Industry and the Growing Importance of Vinyl
Speaker: Dan Francis

1:45 pm - 2:30 pm – Kleine Zaal
PANEL
XP Music Futures Presents: MENA and Physical Goods – A New Market Rising Up
Moderator: Ruben Planting
Speakers: Aseel Barghuthi, Khalil Ryahi, Muhammad Amash, Edwin Harb

1:45 pm - 3:15 pm – Van Beinum Zaal
THE MAKING VINYL LAB
Test Pressings – What They Are Made For
Moderators: Björn Bieber, Thorsten Megow, Piper Payne, Miles Showell

2:30 pm - 2:45 pm - Kleine Zaal
PRESENTATION
Bridging Policy, Heritage, and Industry to Protect Recorded Sound by Podiumkunst.net and Muziekweb
Speaker: Karin van Arkel

2:45 pm - 3:15 pm – Kleine Zaal
PRESENTATION
Pressing Costs, Not Profits: How Vinyl Manufacturers Can Manage Currency Risk
Speaker: Terry Lovell

3:15 pm - 3:45 pm
COFFEE AND NETWORKING BREAK

3:45 pm - 4:00 pm – Van Beinum Zaal
PRESENTATION
World Wide Wax: The Ultimate Vinyl Pressing Plant Marketplace
Speaker: Tim Lambourne

3:45 pm - 4:30 pm – Kleine Zaal
PANEL
Miles of Aisles – Spinning Logistics: Navigating the Vinyl Supply Chain
Moderator: Billy Fields
Speakers: Helen McDonnell, Dick van Dijk, Michael Schuster, Marsel van der Wielen, Jurgen van den Brand

4:00 pm - 4:30 pm – Van Beinum Zaal
PRESENTATION
ISCC and ISO Certifications – The Purpose and the Importance (Presented by Bureau Veritas)
Speaker: Ruben van Mulligen

4:30 pm - 5:15 pm – Kleine Zaal
PANEL
You Got It (Release It): Stripping Down the Value Chain – DIY and Creating Your Own Business
Moderator: Erik Breuer
Speakers: Jeremy Guillot, Dustin Blocker, Andrea Pasini, Federico Berna

5:15 pm - 6:45 pm – Boven Foyer
NETWORKING PARTY

CONFERENCE SCHEDULE

Making Vinyl Europe 2025

FRIDAY

September 26, 2025

From 8:30 am
REGISTRATION & CHECK IN

9:00 am - 9:15 am – Kleine Zaal
Welcome to the 2nd MAKING VINYL SUSTAINABILITY SUMMIT
Speakers: Bryan Ekus, Andreas Kohl, Ruben Planting

9:30 am - 9:45 am – Kleine Zaal
PRESENTATION
The Complete Manufacturing Chain of PVC Explained
Speaker: Andreas Arnold

9:45 am - 10:00 am – Kleine Zaal
PRESENTATION
Plastchem Circular – A New Plastic Recycling Facility
Speaker: Onno-Pieter Sonnega

10:00 am - 10:15 am – Kleine Zaal
PRESENTATION
Recycling Vinyl Records, the Real Story?
Speaker: Hendrik Wolters

10:15 am - 11:00 am – Kleine Zaal
PANEL
Waking Light – Learn from Each Other
Moderator: Julia Völkel
Speakers: Rob van Wegen, Dirk van den Bosch, John Service, Fridolin Pflüger

11:00 am - 11:30 am
COFFEE AND NETWORKING BREAK

11:30 am - 11:45 am – Kleine Zaal
PRESENTATION
Music Declares Emergency Presents: "No Music on a Dead Planet"
Speaker: Julian Bohn

11:45 am - 12:00 pm – Kleine Zaal
PRESENTATION
Take-Back Is the Key – How Reverse Marketing Can Make Vinyl Circular
Speaker: Fridolin Pflüger

12:00 pm - 12:15 pm – Kleine Zaal
PRESENTATION
A Clean and Circular European Industry – What Can We Expect from Brussels?
Speaker: Arthur ten Wolde

12:15 pm - 12:30 pm – Kleine Zaal
PRESENTATION
Good Neighbor, Molding our Future
Speaker: Reyna Bryan

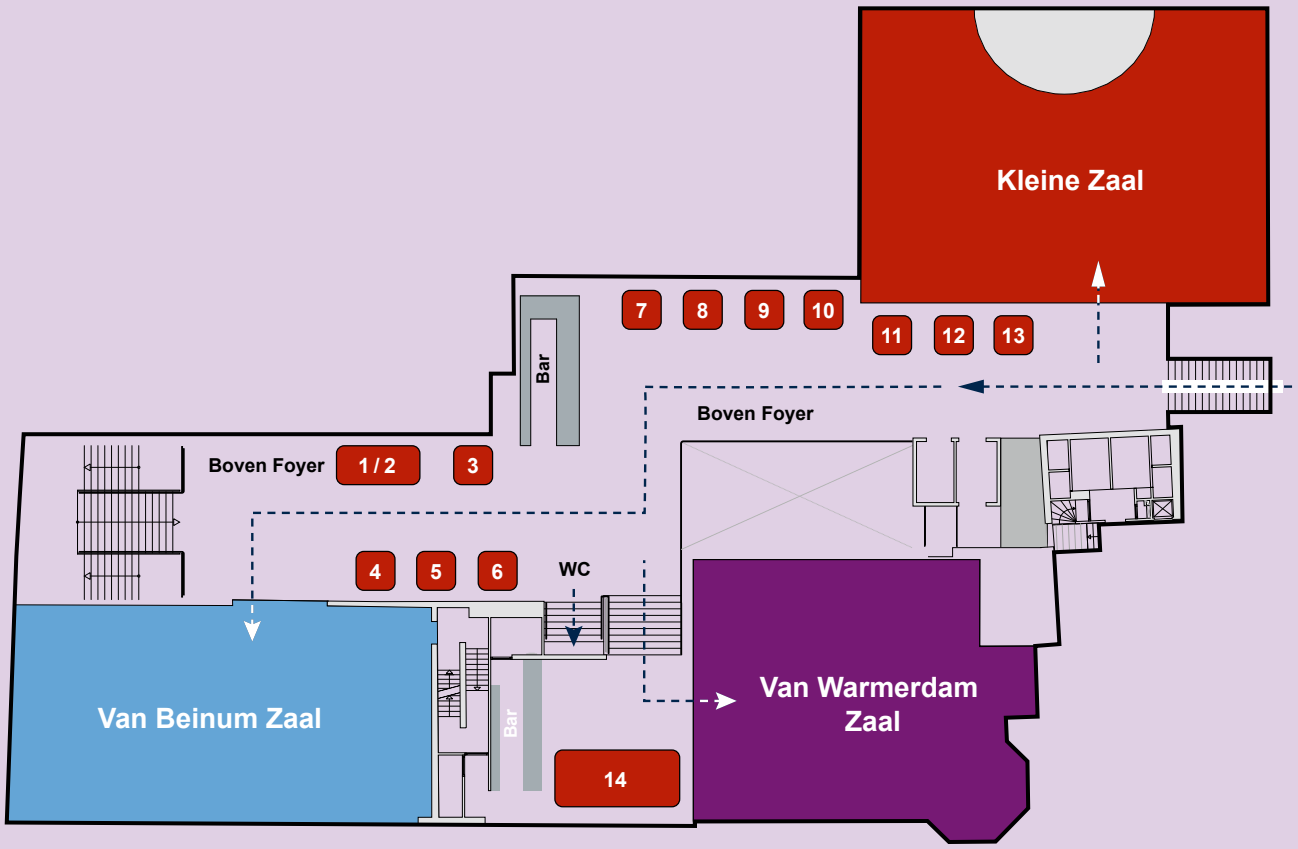
12:30 pm - 1:30 pm
LUNCH BREAK

1:30 pm - 1:45 pm – Kleine Zaal
PRESENTATION
Sustainable Value Chains – Taking a Lifecycle Approach to Reducing the Environmental Impact of Records
Speaker: Ian Stanton

2:00 pm - 3:00 pm – Van Warmerdam Zaal
PUBLIC PANEL
This Is How We Do It – The Path To More Sustainable Record Manufacturing
Moderator: Karen Emanuel
Speakers: Tom Nieuweboer, James Stafford, Peter Runge, Vladimír Víšek, Miriam Lessar

3:00 pm - 4:00 pm – Van Warmerdam Zaal
PUBLIC PANEL
The Cult of Gear – Resisting Elitism in Audio Obsession and a Great Sounding Future for All
Moderator: Michael Fremer
Speakers: Dirk Räke, Jürgen Timm, Gunter Kürten, Edward Forth, Adrian Krupowic

phil. FLOOR PLAN



Sponsor Showcase

1/2	Merchandise& Entertainment
3	Granulat2000
4	Sibert Instruments
5	podiumskunst.net
6	Pheenix Alpha
7	Plastchem
8	M-TECH Engineering
9	IBA Hartmann
10	CAF
11	Tullis Russell
12	Unitra
13	Westlake
14	High End Society

4:00 pm - 5:00 pm – Brasserie van Beinum
PUBLIC PANEL
Venice Listening Session & Q&A
Speaker: Venice

5:00 pm - 6:00 pm – PHIL Café @ PHIL
HAARLEM VINYL FESTIVAL OPENING DRINKS
(Invitation only)

6:00 pm
OFFICIAL START HAARLEM VINYL FESTIVAL

GZ: INDUSTRY'S FIRST LIFE CYCLE ASSESSMENT OF A VINYL RECORD

The music industry is working to reduce its environmental impact, from greener record manufacturing to sustainable touring and eco-friendly merchandise.

All pictures © GZLCA

As a leading vinyl record producer, we wanted to deepen our understanding of this topic concerning our core business – pressing records. Our aim is to make informed, well-supported decisions when planning our sustainability efforts while also helping broaden industry knowledge about this issue.

LIFE CYCLE ASSESSMENT

To better understand the environmental impact of a vinyl record, we used the Life Cycle Assessment (LCA) methodology, which evaluates the impact of a product throughout its entire life cycle or within a defined scope. We chose to calculate the "cradle-to-gate" phase, covering the process from raw material extraction to the point when vinyl records leave the pressing plant. The cradle-to-gate phase was selected for two reasons: (1) it is the phase we, as a pressing plant, can actually influence; and (2) we lack reliable data for the use phase – how many times a record is played and on what setup – as well as for the end-of-life phase, although we like to believe records last for generations.

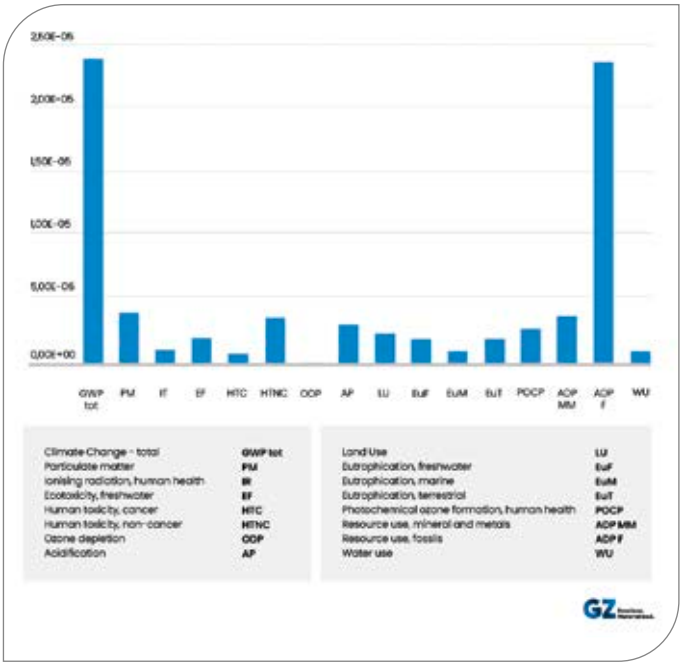
The assessment was conducted for a standard 140 g black vinyl record with a paper inner sleeve, a standard cardboard outer sleeve, and shrink-wrap.

The calculated “cradle-to-gate” phase covers the entire production process of a vinyl record. In our case, the calculation includes the following steps:

Pre-Mastering:
Preparing the music for cutting.
Direct Metal Mastering (DMM) cutting:
Material and electricity consumption.
Galvanization:
Use of electricity, water, materials, and chemicals.
Record pressing:
Consumption of gas, electricity, water, and raw materials.
Packaging:
Paper inner sleeve, cardboard outer sleeve, and shrink wrap.
Material transport:
Delivery of all necessary materials to the pressing plant.
Waste production and disposal:
Managing waste throughout the process, including transporting it to disposal facilities.
Flue gas emissions:
Emissions generated during manufacturing.

The LCA study assesses not only the carbon footprint but also other environmental impacts such as resource depletion, acidification, ozone depletion, or land use. By considering these factors, the method ensures that important environmental aspects beyond CO_2 emissions are recognized.

The results are displayed in the graph below. The analysis identified two main impacts – GWP (Global Warming Potential), which relates to the CO_2 footprint, and dependence on fossil-based resources (ADP-F).

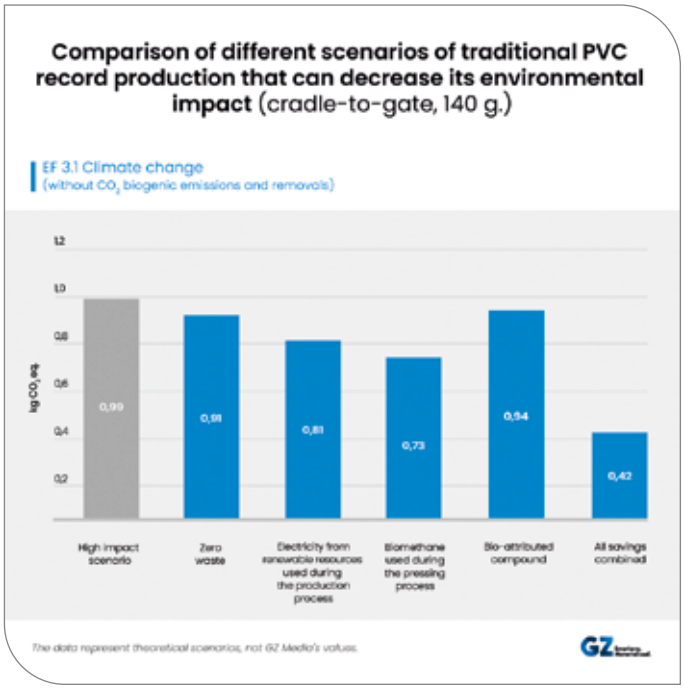


The graph is dimensionless because the results shown represent all examined categories after normalization and weighting. This process converts units from different impact categories into a dimensionless value, allowing comparison between categories and helping to determine the overall impact.

Since the CO_2 footprint was found to be the main environmental impact to address during the cradle-to-gate phase, we aimed to understand what changes a pressing plant could implement in vinyl record production and how these changes would help reduce environmental impact. To do this, we established a baseline “high impact” production scenario representing the most polluting methods and compared it with various alternative options.

High-impact scenario: This serves as the baseline for comparison. It assumes a 10% production waste rate, reliance on fossil fuels, and PVC supplied by a producer with a high carbon footprint.

“Zero waste” production:
Assesses the impact of reducing waste during manufacturing.
Renewable energy:
Evaluates the effects of replacing fossil fuel-based electricity with renewable energy in the manufacturing process.
Biomethane use:
Examines the impact of substituting natural gas with biomethane during the pressing phase.
Bio-attributed PVC:
Assesses the use of a bio-derived compound instead of traditional PVC.



From the results, we can see that the CO_2 footprint of a 140 g PVC record – if produced entirely from fossil-based resources, with 10% production waste, and using PVC with a high CO_2 footprint – can be up to 0.99 kg CO_2e.

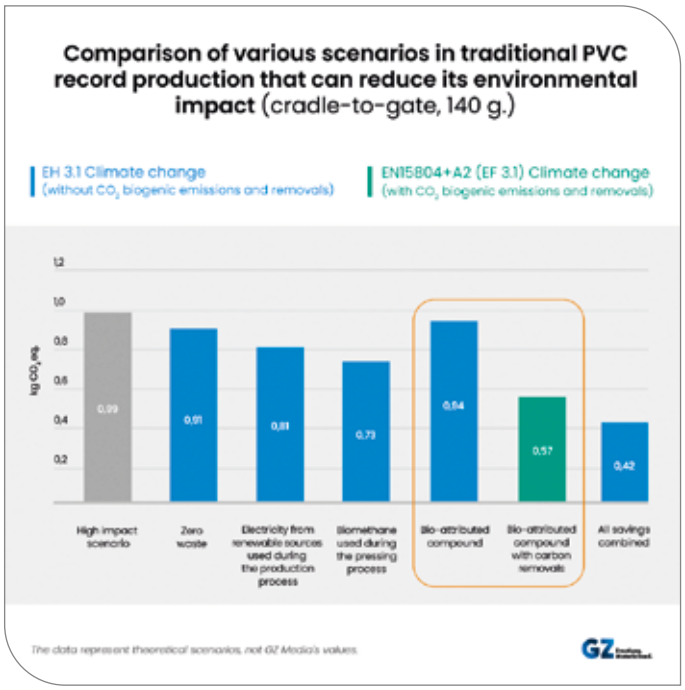
The biggest reduction in carbon footprint would come from using biomethane instead of conventional gas during the pressing process, followed by switching to electricity from renewable sources. Additionally, reducing production waste helps lower emissions by saving both materials and energy.

From the Sustainable Supplier Programme, a joint project of the Music Climate Pact and the Vinyl Alliance, we know that the average emission impact of a vinyl record produced at a pressing plant based in Europe is 0.75 kg CO_2e.

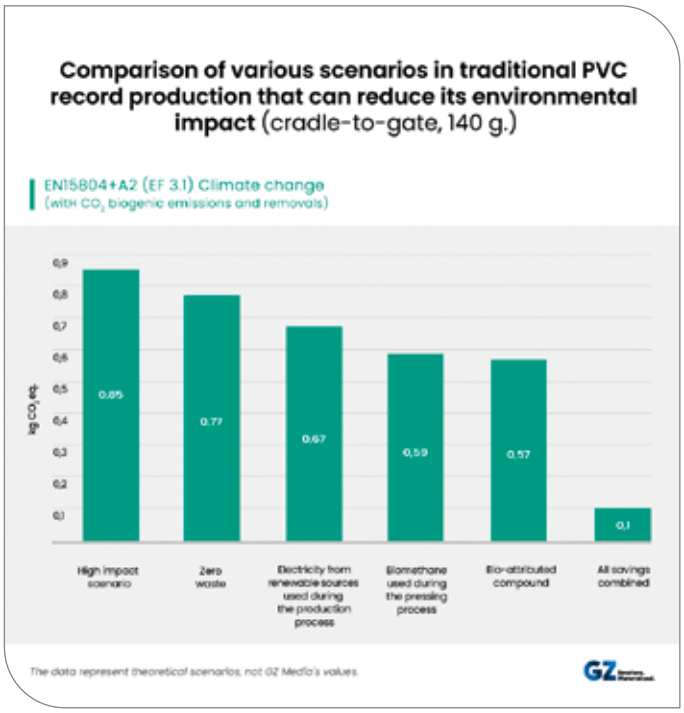
BIOGENIC CARBON AND WHY DIFFERENT METHODOLOGIES YIELD DIFFERENT RESULTS

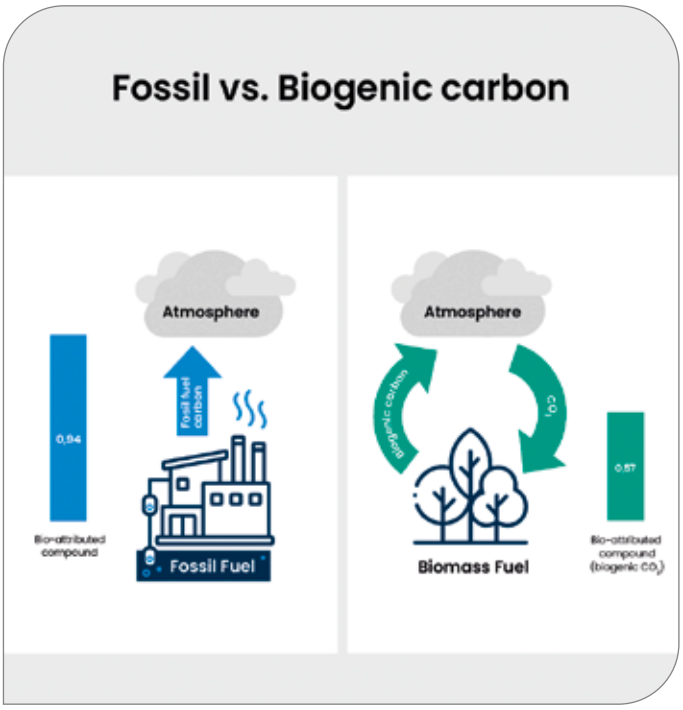
There are two main methods for calculating CO_2 emissions, which differ in how they handle biogenic emissions and CO_2 removals. One method includes them, while the other excludes them (see the info box for more details on biogenic emissions). The primary methodologies that define these approaches are EF 3.1, which does not consider biogenic CO_2, and EN 15804+A2, which does. Currently, biogenic CO_2 accounting is not harmonized, and there is no scientific consensus on whether it should be included. For this reason, the Greenhouse Gas Protocol requires these figures to be reported separately.

The graph below shows the environmental impact reduction of a bio-attributed compound using both methodologies:



Biogenetic carbon comes from organic sources like plants and soil, which absorb CO_2 as they grow and release it when they decompose or are burned. This process is part of the natural carbon cycle and is generally considered carbon-neutral over time.
In contrast, fossil carbon comes from ancient organic matter that has transformed into coal, crude oil, or natural gas over millions of years. Burning fossil fuels releases CO_2 that has been stored for a long time, adding new carbon to the atmosphere and contributing to climate change.





Biogenic carbon is also found in biomethane and cardboard or paper packaging. If a methodology that considers biogenic CO_2 emissions and removals is used, the results would be as shown above.

All of the scenarios mentioned above can be combined and implemented either fully or partially. However, their feasibility depends on economic factors, such as the premium cost of renewable energy and bio-attributed compounds, as well as technical limitations – for example, achieving absolute zero waste may not be possible, but it can be minimized to the lowest achievable levels through improved efficiency and recycling efforts.

More Information on the Study

The Life Cycle Assessment (LCA) was conducted by the external company LCA Studio, led by Prof. Vladimír Kočí, an international EPD verifier. The assessment follows the standardized Life Cycle Assessment methodology in accordance with ISO 14040 and ISO 14044. The Life Cycle Impact Assessment (LCIA) methodology used is Environmental Footprint 3.1. Whenever possible, primary data from production or suppliers were used; when unavailable, data from LCA databases were utilized. The analysis was performed using LCA for Experts software, along with data from the Sphera and Ecoinvent databases.

This study was conducted for GZ Media's internal purposes and reflects the specific conditions and methodologies used at the time of its development. While we share these findings to support broader industry discussions, the data and insights should not be seen as definitive claims or endorsements of a single viewpoint. We invite further exploration and welcome diverse perspectives on the topics presented. This study was published in December 2024.

Limitations of the Study

Data from suppliers may differ in format, scope, and methodology, which makes direct comparisons difficult. Additionally, different LCA databases can produce varying results even when using similar input data. The findings are relevant geographically and technologically but may not apply in other settings. Furthermore, LCA does not consider certain important environmental factors, such as microplastics production.

SEE MORE ABOUT WHAT WE DO IN SUSTAINABILITY:

Our stampers make life easier for more than 40 independent pressing plants around the world.

Could they do the same for you?

We produce them to tighter tolerances than most aerospace applications.

That means test pressings get approved first time – and consistently high audio quality keeps your customers coming back.

Because our stampers last longer, with no unexpected breakages, you get less downtime.

We also know you can't deliver a great service to your customers unless you are getting it from your stamper supplier. You'll get a fast response to queries, clear communication, with typical turnarounds measured in days not weeks. (And an immediate response in an emergency.)

With Stamper Discs, you get to spend more time pressing great-sounding records.

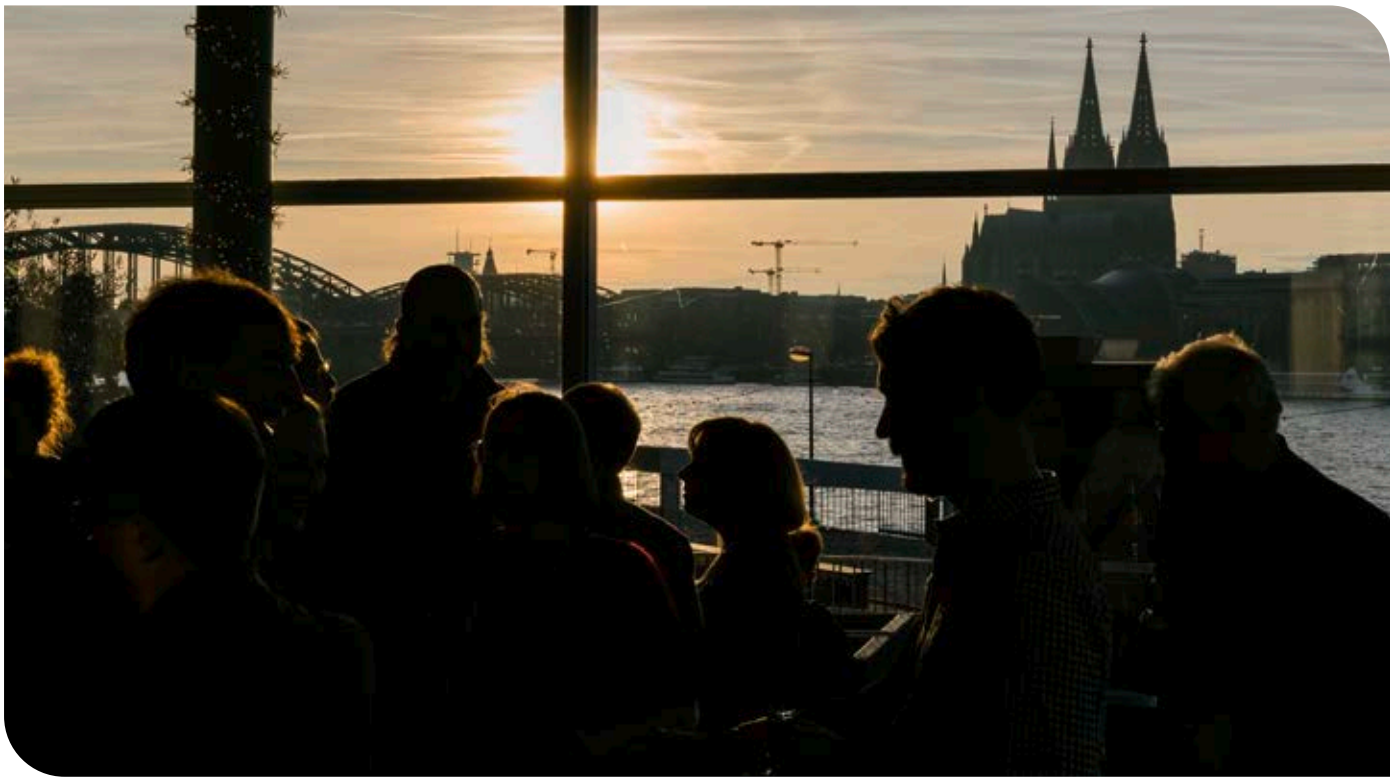
NO STRESS JUST PRESS

Stamper Discs Ltd
85 Burton Street, Sheffield,
S6 2HH, United Kingdom
www.stamperdiscs.com
info@stamperdiscs.com
+44 (0) 7751 566311

EMIL – AN AWARD FOR INDEPENDENT RECORD STORES IN GERMANY

*By **Karen Laube***

Germany has a long-standing and differentiated cultural funding system that also provides targeted support for small, independently run institutions such as arthouse cinemas, bookstores, or live music venues. A key component of this system is sector-specific awards that are low-threshold, unbureaucratic, and simultaneously create public visibility.



Against this backdrop, in 2024, the **Association of Independent Musicians and Music Entrepreneurs** (VUT) was commissioned – at the initiative of the Federal Government Commissioner for Culture and the Media – to design and implement another funding instrument: EMIL – The German Award for Record Stores.

EMIL is exclusively aimed at **brick-and-mortar, independently owned record stores** whose inventory consists of at least 25% new releases. Its objective is not only to provide financial support but also to highlight the **social, cultural, and economic relevance** of these stores.

Record stores are far more than points of sale. They are **community spaces**, sites of **musical education**, hubs for **local music scenes**, and – not least – essential **distribution partners for independent artists and labels.**

To raise awareness for the award, around **450 record stores across Germany were contacted** in an initial postcard campaign. At the same time, an **online application portal** was launched, accompanied by a **social media campaign** featuring interviews, videos, and editorial content on Germany's record store culture.

Throughout the application period, participating store owners received **technical and content-related support** – a measure that helped ensure high-quality submissions and fostered productive dialogue between the VUT and the participants.

The response was strong: **95 stores from 15 federal states** applied for the inaugural edition of the EMIL. An **independent jury** – composed of music journalists, artists, distributors, and curators – selected **14 award recipients** in four categories:

www.deutscher-preis-fuer-schallplattenfachgeschaefte.de

- **Best Independent Record Store** (10 awards of € 15,000 each)
- **Innovation** (€ 25,000 each)
- **New Business** (€ 25,000 each)
- **Structurally Disadvantaged Region** (€ 25,000 each)

In addition to financial support, **public visibility** was a central goal. The winning stores were featured on the **EMIL website** and across **social media platforms** with portraits, videos, and interviews. Press coverage, radio features, and trade media articles expanded the award's reach. EMIL thus became not only a funding tool, but also a **public statement in support of cultural diversity and the independent music retail sector.**

A key finding from the project: While the stores vary greatly in size, focus, and approach, they face similar challenges. These include **increased direct-to-consumer sales by labels, unpredictable pricing, and weak distribution infrastructure.** Despite the ongoing vinyl boom, many small stores have **not significantly benefited** in economic terms.

To address these structural challenges, the VUT launched a new networking format: **EMIL_vernetzt** ("EMIL_networked"). In regular meetings, store owners collaboratively define problems, prioritize issues, and develop practical solutions. This exchange is intended to grow over time and be sustained by the community itself.

EMIL stands as an **exemplary model of contemporary cultural funding,** integrating artistic, economic, and societal perspectives. It is more than an award – it is **a catalyst for visibility, self-organization, and political attention.**

Under the motto **"Act United – Stay Independent"**, the VUT has long championed better conditions for the independent music sector. With EMIL, a powerful instrument has been created that gives visibility to a long-standing but often overlooked branch of the music industry – and demonstrates how cultural funding can be implemented **effectively, tangibly, and close to the people who make it happen.**

All pictures © Christian Rothe

VRMA ANTI-PIRACY GUIDELINES FOR RECORD PRESSING PLANTS

*By **Greg Schoener***

The manufacture and distribution of counterfeit vinyl records is certainly not a new development within the music industry; it has been well reported and documented. Since the advent of digital distribution and streaming; however, much of the resources and focus from various industry associations and governmental agencies has shifted to contesting copyright infringement in the digital realm.

For that reason, the Vinyl Record Manufacturing Association (VRMA) has elected to take an active role in copyright protection and its implications for the music industry, with an emphasis on educating and training pressing plants.

UNDERSTANDING VINYL RECORD AUTHENTICITY

Counterfeit vinyl records are unauthorized reproductions of officially released albums, created to deceive consumers. Original pressings have distinct features, like specific label designs or matrix numbers etched or scribed into the runout area of the record that may be difficult for a counterfeiter to replicate.

EMERGING TRENDS IN VINYL RECORD COUNTERFEITING

1. **Increased sophistication in production:**
   - » Counterfeiters are leveraging advancements in manufacturing and printing technologies to create high-quality counterfeit records that closely resemble original releases.
   - » Counterfeiters can replicate packaging, logos, and trademarks with remarkable accuracy.
2. **Focus on limited and special editions:**
   - » Counterfeiters are targeting rare and limited-edition releases to exploit the high demand and perceived value associated with these products. (See photo examples).
   - » Adding illegitimate stickers or other markings to counterfeit records to make them appear as limited editions or promotional copies.

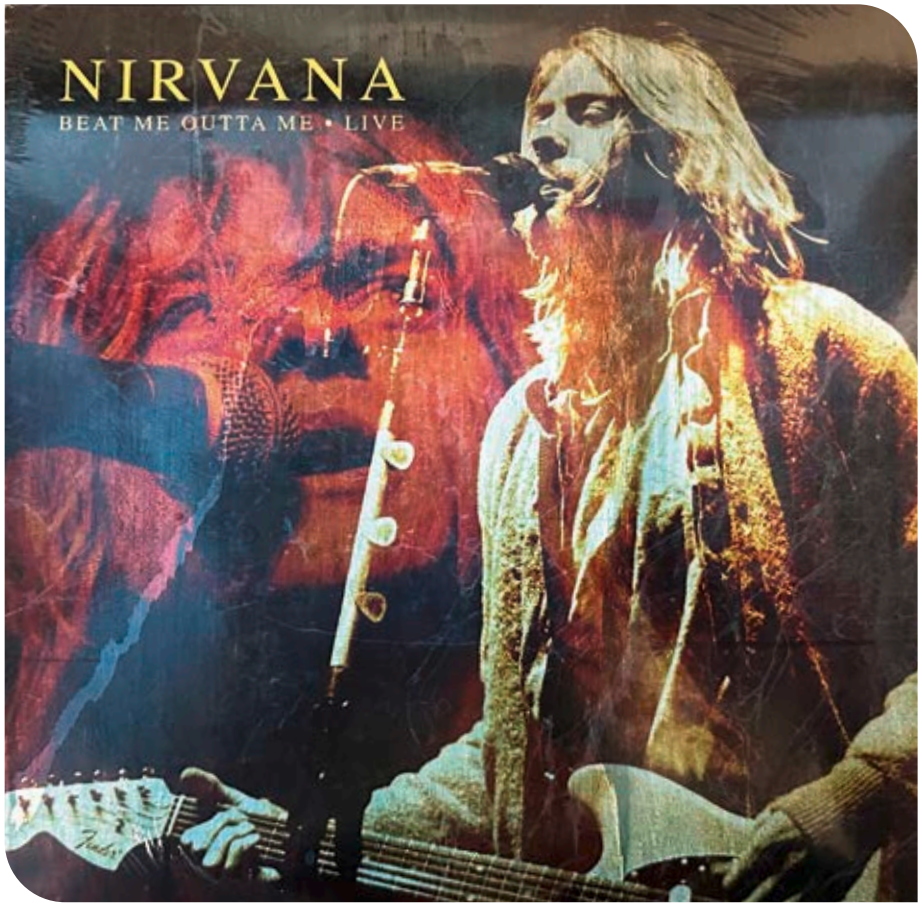
3. **Exploitation of online marketplaces:**
   - » Online marketplaces provide counterfeiters with a vast and often anonymous platform to reach global consumers.
   - » Some online sellers may offer multiple copies of rare, out-of-print records at questionably low prices, which can be a red flag for counterfeit activity.
   - » Industry organizations and anti-piracy initiatives
   - » The Recording Industry Association of America (RIAA): represents the interests of the music industry and works to combat piracy.
   - » The International Federation of the Phonographic Industry (IFPI) represents the interests of the global music industry and works to combat piracy

As stated earlier, these organizations; while not turning a blind eye to counterfeiting of physical products, have clearly shifted their resources and focus to the digital realm. The good news is a considerable amount of effort was put into publications for the expressed purpose of educating and training optical disc pressing plants. This is very useful information that was simply resurrected and applied to vinyl records.

ANTI-PIRACY BEST PRACTICES FOR VINYL RECORD PRESSING PLANTS

1. **Customer and broker notification and identification:**
   - » Notify customers and brokers that your plant observes anti-piracy good business practices.
   - » Know the ultimate customer; ensure you always know the final customer for each order, even if working with brokers.

2. **Content verification and rights checking:**
   - » Obtain complete content details: For every order, require a complete artist and track listing from your customer or broker. You need to know what you're manufacturing.
   - » Examine artwork and packaging: Carefully review artwork, labels, and any other packaging to ensure consistency with the provided content details.
   - » Listen to the music.
   - » Check rights ownership: Unless you are absolutely certain of ownership, carry out checks using online databases (e.g., AllMusic, Amazon, Billboard) or industry resources to confirm who owns the rights to the recordings.



All pictures © Greg Schoener

- Require verified ownership/licensing documentation: Do not accept simple declarations of ownership. Demand verifiable documentation, such as a direct license from the rights holder or a letter on their official letterhead confirming your customer's authorization to press the records.

3. **Look for piracy indicators:**
   - Be aware of common piracy red flags: Scrutinize orders that exhibit indicators often associated with counterfeited products (e.g., suspiciously low price, blurry graphics, misspelled words, unknown record labels).

4. **Documentation and record keeping:**
   - Maintain thorough records: Keep detailed records of each order for a minimum of 4 years (or longer if your country's statute of limitations for civil claims is longer).
   - Essential records include: Customer details, production records, delivery records, invoices, track listings, ownership/licensing documentation provided by the customer, and samples of the final vinyl records and associated packaging.

5. **Staff training and compliance:**
   - Designate a Compliance Officer: Appoint a qualified plant employee to be responsible for anti-piracy efforts, including training, reviewing orders for piracy concerns, and conducting customer background checks.
   - Conduct piracy awareness training: Educate appropriate plant personnel about piracy indicators and best practices for prevention.
   - Implement internal corrective procedures: Establish clear procedures for addressing non-compliance with anti-piracy protocols.

By implementing these measures, vinyl record pressing plants can proactively contribute to the fight against counterfeit records and protect the rights of creators and rights holders in the music industry.

Final thought …

It is important to note that the fight against vinyl piracy is a multi-faceted endeavor that requires a collaborative approach involving record labels, artists, manufacturers, retailers, government authorities, and consumers.

ECHOES OF THE EAST, REMASTERED
POLAND'S HI-FI PHOENIX: THE RISE, FALL, AND RETURN OF UNITRA

*By **Adrian Krupowicz and Andreas Kohl***

When the Berlin Wall fell and Socialism collapsed across Central and Eastern Europe, it wasn't only political institutions and borders that crumpled – whole industrial ecosystems did too. Noises by domestic HiFi brands had filled living rooms, student dorms, and factory workers' flats from Leipzig to Lviv, from Gdansk to Bratislava. They were household names, backed by state planning and protected markets. But when those walls came down, so did the industrial ecosystems that sustained them. Three brands, three fates: RFT vanished silently. Tesla fragmented – though part of it would help launch one of the world's most renowned turntable makers. And Unitra? Unitra is the one writing a comeback story worth turning up the volume for.

In the German Democratic Republic, RFT (Rundfunk- und Fernmelde-Technik) was not a single factory but a state-run umbrella brand uniting dozens of production plants. For example: radios in Rostock, televisions in Staßfurt, speakers in Leipzig, turntables in Teltow, Leipzig, and Zittau, and all carried the RFT logo. Central planning meant unified designs, standardized parts, and guaranteed markets across the Eastern Bloc. That strength dissolved into weakness after 1990. German reunification brought privatization. Some plants were sold to Western firms, others closed entirely. With no central coordination, RFT as a brand simply disappeared. Consumers, now with access to cheaper, flashier imports from Japan and Western Europe, abandoned the old GDR gear. In just a few years, RFT went from a badge of familiarity to a relic of an extinct economy.

Meanwhile, in Czechoslovakia, Tesla was the counterpart: a massive state-owned electronics conglomerate with diversified production, from radios, speakers, reel-to-reel recorders, turntables to vacuum tubes and industrial electronics. Post-1989, Tesla splintered. In 1991, Austrian HiFi entrepreneur Heinz Lichtenegger visited one of the Tesla plants in Litovel. He saw skilled workers, proven tooling, and decades of turntable know-how assets that were about to be lost. Partnering with Litovel's new private successor, SEV, Lichtenegger launched Pro-Ject Audio Systems. The first model, the Pro-Ject 1, was essentially a Tesla-engineered design, refined for Western tastes – minimalist, affordable, built to last. It became a hit. And the rest, they say, is history.

Poland's Unitra was neither a single company nor a single factory. 100,000 employees and 47 branches, which included research institutes, electronic components plants, and factories producing finished devices. Additionally, there were exports to numerous countries worldwide. Under socialism, Unitra's products were a staple in Polish homes and exported throughout the Eastern Bloc — solid, affordable, and locally engineered. When the planned economy collapsed, so did Unitra's organizational structure. The association dissolved; its members were scattered. Some factories closed, some changed their profile. By the mid-1990s, the familiar Unitra logo had all but vanished from shop shelves. But unlike RFT, which disappeared, and Tesla, whose identity dissolved into fragments, Unitra retained something invaluable: brand memory. In Poland, Unitra had never really been forgotten - its name still evoked reliability, domestic pride, and the tactile ritual of listening. And this memory even remained intact when music listeners went from vinyl, cassette tapes, compact disc, computer, to a phone and a Bluetooth speaker – all at the cost of compromising between quality, ease of use and accessibility, or as Adrian Krupowicz from the resurrected Unitra brand puts it: "It marked the commencement of a transition into an era characterized by consumption and mass production, where the threshold for replacement remains low. What breaks, gets thrown away, and sometimes it proves to be cheaper than taking care of it and repairing it, even frequently. It is possible that there is an underlying method to this approach. Sometimes something has to go wrong to appreciate the value of previous solutions. I appreciate

All pictures © Unitra

the current times, where we have finally realized certain issues, we are starting to respect the natural environment more, and appreciate valuable things. Fortunately, this is also the case in the audio world."

In 2021, three partners – Michał Kiciński, Daniel Kostrzewa, and Adrian Krupowicz – saw the potential in the earlier described memory and the shift in consumer approaches that is heavily interwoven with the vinyl record resurgence. They secured exclusive rights to the Unitra brand and founded Unitra Sp. z o.o., based in Warsaw's Ursus district. Their goal wasn't just nostalgia. As Kostrzewa put it: "This is not a nostalgic cash-grab – it's our answer to overstimulated, disposable technology." The new Unitra would focus on durability, repairability, and mindful listening, marrying heritage aesthetics with modern engineering.

In 2024, Unitra unveiled a complete range: integrated amplifiers, direct-drive turntables, CD players, bookshelf and floor standing speakers, even premium cables and vinyl test records. The designs are clean and analog-inspired, but with subtle modern touches like e-paper displays and precision machining. „We started with memories, dreams, and a team ready to face many challenges." says Adrian Krupowicz. "At the beginning, we had been shaping our ideas, sketches of devices. The question was and still is: what would the original Unitra engineers do nowadays? At the very beginning, we asked this question to former employees in a meeting that we organized exclusively for them."

Unitra represents a brand legacy that has been developed over several generations, and disregarding its contributions would mean overlooking a significant and powerful part of audio history. RFT shows what happens when a brand disappears with its industrial base. Tesla shows how fragments can survive if someone recognizes their value – as Litovel's partnership with Pro-Ject proves. Unitra maintained a continuous presence in Polish cultural memory and has now reemerged as a contemporary brand, blending heritage with modern design and technology.

This revival aligns with broader trends in audio and consumer electronics, where interest in durable, well-crafted products has grown alongside renewed enthusiasm for vinyl and analog sound. Unitra's return also highlights how former Eastern Bloc brands are finding new ways to engage global markets, combining local craftsmanship with international ambition. In an age of mass-produced anonymity, Unitra soothes with substance. Adrian Krupowicz wraps it up like: „Let's look for our own sound! It can be helpful to use AI and algorithms when discovering music, as these tools can simplify the process. However, for those who want to experience music with high fidelity and hear the intended nuances from the creator, using physical media and quality audio equipment is recommended. If you have not tried this yet, you might consider borrowing equipment from friends or visiting an audio store. Over time, you may want your own high-quality audio system."

PHEENIX ALPHA

No.1 in Vinyl Reco

The AD12 Manual

Pheenix is proud to announce the return of manual production, complementing our flagship automatic AD12 system.
By reintroducing the manual process, we are now able to offer unique and customized vinyl pressings, including sought-after formats such as picture discs, splatter patterns, and multi-coloured vinyl. This move reflects our commitment in supporting independent artists, boutique labels, and anyone looking to create truly extraordinary vinyl records.

Flexibility with Dual Press Options
The AD12 Manual also allows customers to expand their setup with two presses serviced by a single extruder, enabling efficient production at a higher scale. Additionally, customers can choose extra extruders for the creation of multi-colored vinyl records, providing more options for creative and artistic projects.

Splatter Kit
Upgrade your AD12 with Splatter record production capability!

Pheenix Automatic Raw Material Feeder
When combined with our compact inline grinder, it creates an excellent solution for sustainability by enabling efficient reuse of flash material directly in the production process. A smart step toward reducing waste and increasing circularity.

Dynamic grinder
Our powerful grinder efficiently processes several pucks and multiple records at once. Together with our **Label Punch** that efficiently removes labels, you can streamline your recycling process. Making you a more sustainable producer.

rd Pressing Equipment

Pheenix Folder Gluer
Markets most compact folder gluer, formats **7″ 10″ 12″.**

Why settle for less?

New in Business or Years of Experience?
Whether you're a newcomer to vinyl record pressing or a seasoned expert, we're here to assist you. We've been delivering fully automatic vinyl pressing machines for decades, many of which are still operating today. Pheenix Alpha AD12 offers unparalleled reliability, boasting the market's best uptime.

Pheenix Plating Suite – Based on Toolex superior plating technology!

Scalable to suit your productions needs. Complete range of systems for stamper production from lacquer/DMM to family production.

Historic Day at Furnace

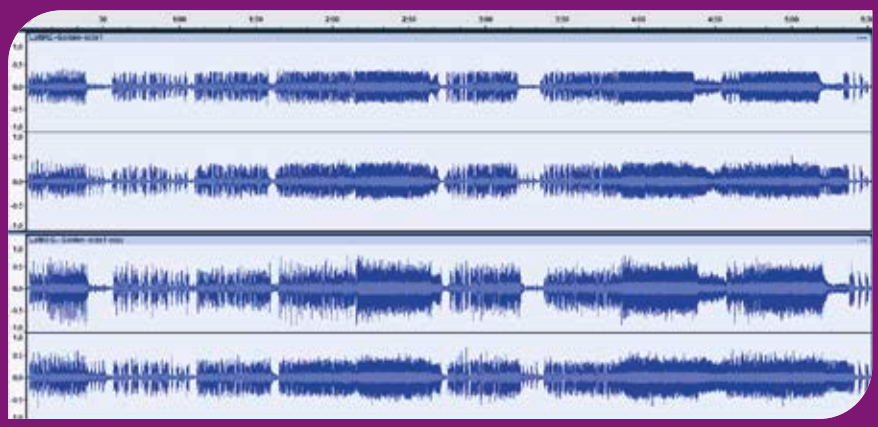
A milestone was reached at Furnace with the launch of the newly commissioned galvanic plant in the USA. After thorough preparations and fine-tuning, the facility is now ready to take stamper production to the next level.
Equipped with Pheenix Alpha's state-of-the-art technology, the new machine park ensures a more efficient and high-quality production process. It marks a significant investment into the future.
Pheenix Alpha secured a fast and successful startup through close collaboration with Furnace technicians and Sibert's equipment by Ian Locke, with a strong focus on precision. The very first stamper matched the AD12 Moulds perfectly and increased quality and lifetime on the Stamper.

Customer Comment: Mark Reiter, Executive Vice President | Furnace Record Pressing
"The performance of the new galvanic line has exceeded our expectations. From day one, we've seen improvements in stamper quality and durability, consistency, and production speed. The installation and accuracy of the Pheenix electroplating equipment reflects their commitment to excellence and deepens the collaborative relationship between Furnace and Pheenix. The new plates are a perfect match for our AD12s as well as our manual presses. This is a game changer for Furnace and our customers."

WE'VE GOT 'EM,
NOW, HOW DO WE HOLD 'EM?

*By **Michael Fremer***

Watching vinyl records fade to black in the late '80s Joe Harley (today better known as Blue Note Records' "Tone Poet") and I used to have long conversations about how we might reverse the seemingly inevitable. "If only we could get kids to hear how great records sound", we fantasized, never believing it would happen, "…they'd love the sound!" They'd dig the dramatic 12x12 packaging and vastly superior artwork.



Lotti Golden, a '60s era Atlantic Records artist had her cult favorite debut album Motor-Cycle reissued recently by High Moon Records. The vinyl version mastered at Digi-Prep by veteran mastering engineer Dan Hersch at D2 mastering sounded nothing like a typical Atlantic Records album of that era. The reissue sounded spatially flat, dynamically compressed and very "modern". Not sure why Hersch "squashed" it.

An original pressing ordered on Discogs sounded as expected: dynamically expansive, spacious, and very analog-like. A very good recording at Sound Center New York City, mastered by Dennis King at Atlantic Studios. Digitized and put up on Audacity shows what is easily heard on the two records. The top image shows flattened "picket fence" squashed dynamics. The bottom one shows wide dynamic variations. Obviously the label chose to use the "squashed" file rather than spend a bit extra to give vinyl buyers the dynamics found on the original pressing. Why bother with the vinyl version? It sounds like a badly compressed file.

They'd love browsing record store bins and sharing opinions with fellow shoppers. They'd even enjoy the sensuous pleasures of feeling various paper stocks and laminates. They'd want to own their favorite music on vinyl and become collectors and start behaving like we did as kids and still did then as middle-agers. What's more satisfying than staring at a wall full of well-curated records? Records even smelled better we only half-joked.

We'd both done the listening, looking, touching and shopping, and for us there was no doubt about which experience was best. But how to reach the late Gen Xers who grew up with cassettes and CDs and for whom vinyl was the most uncool, impractical, unportable Boomer format ever?

This at a time when record stores were either closing or converting to jewel case sterility and record presses were being sold as scrap metal. It was hopeless.

Now that our wildest, most unlikely vinyl revival fantasies have been exceeded – and there's no point going over how the improbable happened because you all know who you are – we spend our time worrying about the all too familiar trends that threaten the format's future growth, even its well-being and long-term viability.

Negative trend lines include forcing reissue labels to use tape copies instead of original masters (when masters were previously available and returned without incident), cutting lacquers or DMMs from "smashed" files originally intended for loud sounding CDs to save the cost of producing a separate vinyl-friendly master, false or deceptive claims of using "original master tapes" cutting for "lowest common denominator" turntables rather than for best sound, cutting from files when a high quality usable tape is available, sloppy or non-existent quality control, skimping on jacket and scan quality, awarding cutting jobs to the lowest bidder, rather than to the best talent for the particular job, not overseeing the entire process from test acetates to test pressings and instead leaving it all to chance.

A series of worthwhile recordings were released by a major label cut for some reason fixed pitch at an impossibly low level that robbed them of all musical life that never should have happened, but no one was paying attention and stereo record releases packaged in mono artwork that are a wonderful surprise for some buyers but less so for mono cartridge owners where a few plays crush the vertical groove modulations.

Another serious problem is confusion in the bins. You can visit a record store looking for a particular title and find multiple editions of the same record, priced low and poorly pressed for a title with lapsed copyright protection cut from a commercial CD using an artwork variant (because the original image is still protected) to a double 45 rpm edition cut all-analog (tape to lathe) by a noted mastering authority using the original master tape and pressed on the highest quality vinyl formulation.

True there's something for everyone here, but confusion reigns in the bins because of this and that leaves buyers less than confident about what to buy so some buy none. It's easy enough to print and post in each divider what these different pressings are and how they differ. Every record store should do this. Few if any do. Probably they should avoid altogether the CD sourced copyright lapsed exploitative versions but that's their choice.

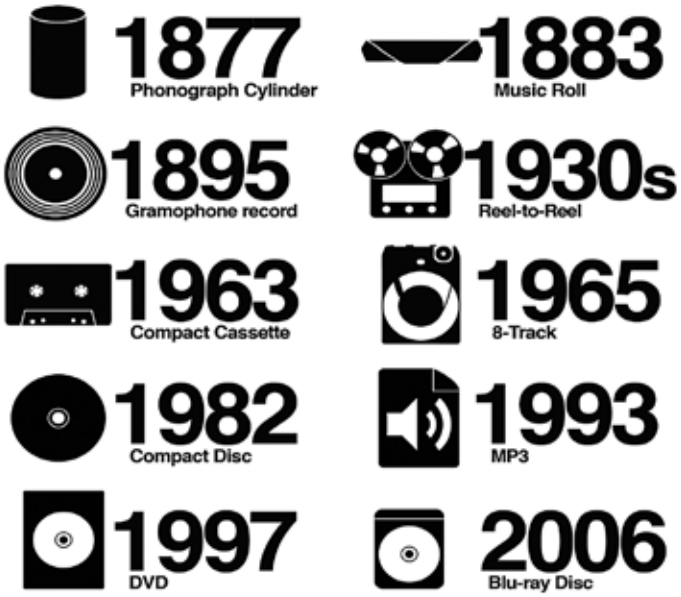
The bottom line is, no record buyer should hear better sound from a streamed file than from a record they've bought! Finger pointing is easy in all of this, but the point here is not to point fingers. The point is, if we want to keep record enthusiasts happy and buying, we all need to do our best to produce the best records we know how to manufacture throughout the production chain.

TEST RECORD – HOW TO MAKE THE PERFECT ONE AND WHETHER IT IS WORTH CHECKING THE CALIBRATION OF A TURNTABLE USING IT?

*By **Adrian Krupowicz***

Understanding how a gramophone record is made helps in knowing how to use it properly. The unique operation of this device, invented in 1895, made it the third major music recording medium – and the only one to endure throughout the history of recorded music.

Furthermore it is important to highlight that, alongside the evolution of the album, the practice of presenting musical content through sophisticated cover designs featuring exceptional photography or artwork has reached a high standard. This approach has significantly contributed to increasing recognition and popularity for many artists.



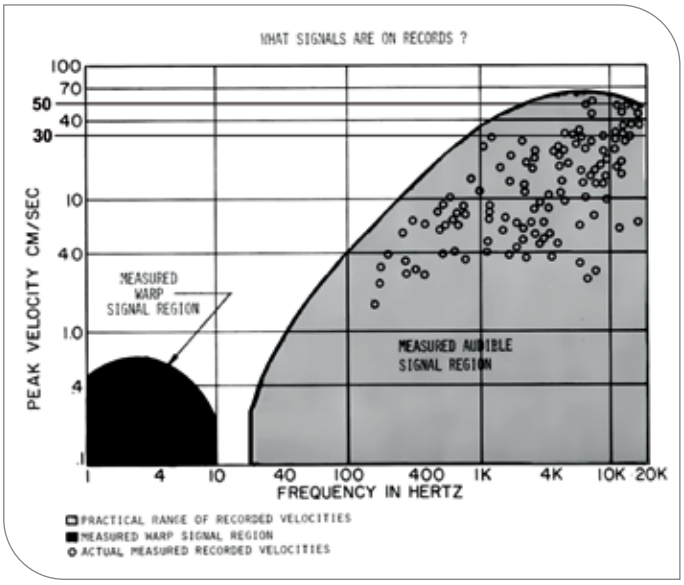
And here we are now, celebrating the vinyl record as a medium of longevity and stability, despite, or maybe because of its limitations?

For me, as an engineer with long experience, the most interesting things are the seemingly simple solutions, which solve many difficult technical issues. It is not true that the most complex mechanisms or systems are the best. It's much harder to make something well-engineered with fewer pieces. The gramophone record is a good example for this approach: the audio signal is directly inscribed into the grooves, with careful consideration of numerous technical factors, but visible, easy to understand, and accessible.

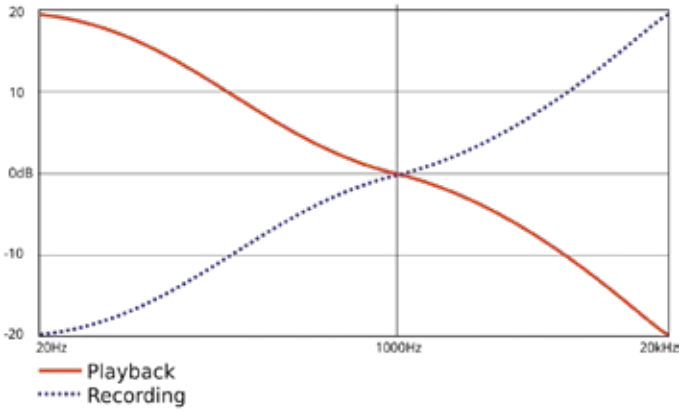
In its early stages, the record saw several significant developments and inventions, including two that were particularly notable among numerous others. But these made the record what it is today. The first is Peter Carl Goldmark's development of microgroove technology at CBS Laboratories, which allowed for denser recording on discs and introduced a change from 78 to 33 1/3 revolutions per minute. The image below shows a comparison between the amount of material stored using the older and newer technologies.

The second individual to mention is Alan Blumlein, often referred to as the "Father of Stereophony." He pioneered the method of recording two audio channels at a forty-five- degree angle, significantly contributing to ensuring compatibility with the pre-existing horizontal mono recording format.

With appropriate consideration given to vinyl records as a format, calibration of the turntable shall be addressed.



Sure, it is important to take into account the characteristics of RIAA equalization, which is the most commonly used standard. Remember, discs have major limitations. Equalization is used to reduce bass amplitude - preventing excessive stylus movement in cutting and playback - and boost treble to improve signal-to-noise ratio.



Imaged measurements of cantilever velocity indicate that the highest frequency tones are constrained by the practical capabilities of the cutting head when transferred onto lacquer. Consequently, it is uncommon to find gramophone records with RIAA equalization that contain signals exceeding 16 kHz.

But let's check what a good calibration record might need to provide: First and foremost, it shall assist in adjusting the five key aspects of tonearm and cartridge calibration.

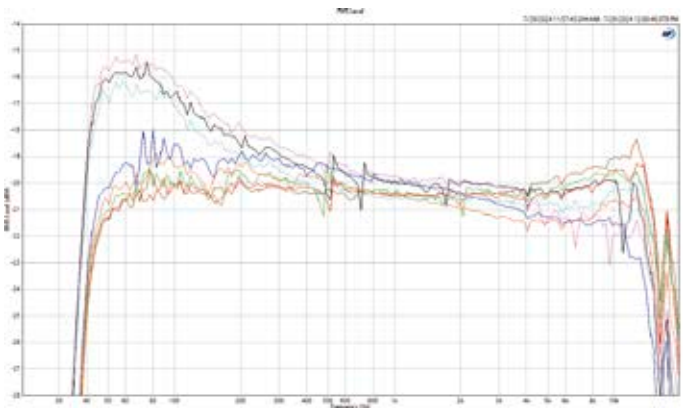
- Adjusting the vertical tracking angle
- Adjusting the azimuth
- Aligning the cartridge
- Adjusting the stylus downforce
- Adjusting the anti-skating force

In addition to the above, we also wanted to have perfect Wow & Flutter and frequency response measurement. Overall, these requirements present a goal not easy to be achieved. But we took the challenge and prepared for extensive testing with assistance from Takt, a pressing plant, and Mastering Studio, managed by Tomasz Wójtowicz.

» Continue on next page

Accurately measuring speed stability required only a high-quality pressing process, while achieving stable amplitude across frequencies for frequency response analysis was significantly more challenging.

There were two important issues here. Firstly, we performed a series of cutting tests to check at which amplitude we achieved constant gain in the entire band, and the use of Audio Precision equipment with a synchronization tone. That's why we have three tracks with different recording levels (0, -14, and -20 dB from the reference level).

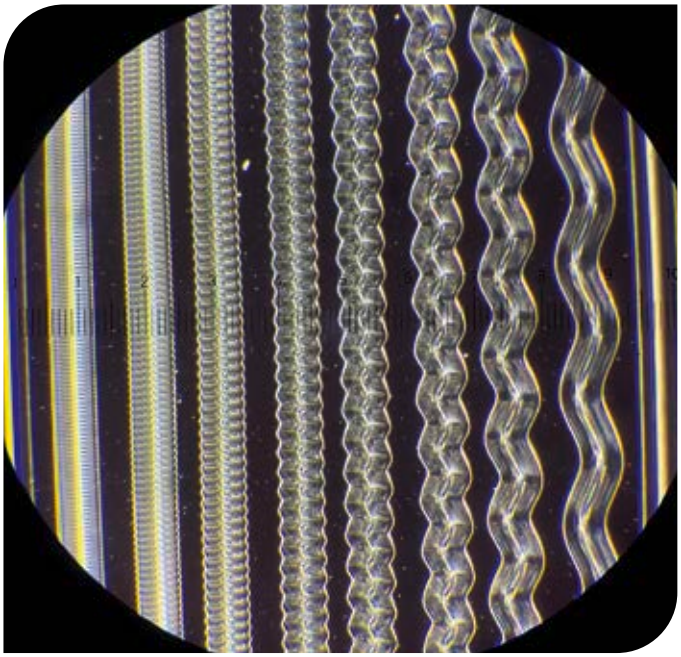


Secondly, accurate reproduction of frequency response depends on both the quality of the turntable or cartridge and the integrity of the entire audio path from the cartridge to the amplifier's signal output. This includes not only aspects such as connector quality or cable material, but also fundamental elements like cable capacitance. The signal from the cartridge is low in amplitude, similar to signals from microphones or magnetic pickups in electric guitars. As a result, any changes in the connection can significantly affect performance, making it useful to measure the system under different configurations, such as varying capacitance settings or using different phono cartridges. This approach allows for practical assessment of system performance. For advanced users, it is possible to generate sets of characteristics or compare various phono cartridges. This led to the development of the WT-2 disc set.

Additionally, we implemented an innovative approach by providing descriptions of the tracks directly on the record itself.

For less experienced people, a simplified version in the form of WT-1 has been created. Here we have Picture Disc technology, which, of course, results in a partial loss of quality. That is why tracks requiring the highest parameters do not occur on it. It is simpler to use, and its main purpose is to set the five basic settings of the tonearm and cartridge that I mentioned above.

WT-3 is currently in development and will not be sold commercially, as it is primarily intended to support the launch of new cartridges from our company.



RIAA equalization is essential for both disc playback and listening. However, when designing a turntable cartridge, it's important to measure not only the audible range but also higher frequencies - hence manufacturers often state that cartridges can transmit up to 50 kHz.

A test record can be understood in many ways and more than one has already been created, but if it is well thought out and you know how to use it, it is a valuable element of diagnosis.

MAKING VINYL EUROPE 2025

OUR SUPPORTERS

A2IM AMERICAN ASSOCIATION OF INDEPENDENT MUSIC

AIM ASSOCIATION OF INDEPENDENT MUSIC

AFEM ASSOCIATION FOR ELECTRONIC MUSIC

audio-technica.

EB ENTERTAINMENT BUSINESS

ELAC The life of sound.

era THE DIGITAL ENTERTAINMENT AND RETAIL ASSOCIATION

futuresource CONSULTING

Haarlem Vinyl Festival

MAGAZIN FÜR INSOLVENZ & POP

ifpi representing the recording industry worldwide

MINT MAGAZIN FÜR VINYL-KULTUR

MUSIC CONNECTION

MUSIK WOCHE

OCTAVE

podium kunst .net

POPmid USA MUSIC INDUSTRY GATHERING

STOKYO

TAD TECHNICAL AUDIO DEVICES LABORATORIES, INC.

THORENS®

TRANS ROTOR

Vinyl & ...

THE VINYL District

vinyl INSTITUTE

DER VINYLIST Musikmagazin für Schallplattenfans

vut GERMAN ASSOCIATION OF INDEPENDENT MUSICIANS AND MUSIC COMPANIES

ORGANIZERS

Colonial PURCHASING CO-OP Serving The Media Industry Since 2004

s|k studio krause

phil.

AND THEN THERE WERE ONLY THREE!

*By **Frank Wonneberg***

You would expect there to be at least a dozen major record companies operating worldwide. That is not the case. For over ten years, there have only been three major corporations: SONY MUSIC, WARNER (WMG), and UNIVERSAL (UMG).

The three major record companies hold the rights to most commercial sound recordings released since 1894. Their archives typically include original master materials, such as metalworks, audio tapes, and digital media. All three are governed by United States copyright law under the Music Modernization Act of 2018, which extends protection to all recordings made prior to 1972 until the year 2067, at which time these works will enter the public domain. In jurisdictions outside the United States, copyright terms can be shorter; for instance, in Europe, protection generall lasts for 70 years following the death of the author or from the date of the recording's publication.

THE USA IN THE 1970S

Until the early 1970s, there were at least eight major record companies in the USA. The giants were RCA Victor and Columbia Records. Both were record companies that could handle all tasks internally, from recording studios to pressing plants, with A&R managers, graphic designers and their own distribution organisations. RCA and Columbia functioned as independent companies under larger media conglomerates that owned radio and television stations across the country, which contributed to this growth. Capitol Records had developed into a small major label in the 1940s and was acquired by the British company EMI in 1955. ABC Records was established in 1955, and its subsidiary jazz label, Impulse!, achieved notable success. Movie giant Warner Bros. launched their record label in the late 1950s and acquired Reprise Records from Frank Sinatra in 1963. When Warner also incorporated Atlantic and Elektra Records in 1970, the global business was established as WEA International with partners in all major markets. In 1972, MCA formed a new small major label by merging Brunswick, Coral, Decca (USA), Kapp, and Uni's operations. In 1956, Norman Granz founded the independent label Verve Records. MGM bought their extensive catalogue in 1961 and ran Verve successfully until 1972. Then PolyGram, the multinational record company owned by the Dutch Philips and German Siemens, took over. PolyGram acquired various other labels: Verve, Mercury, RSO, Casablanca, Decca (UK). However, after a period of rapid growth, the company reorganised in 1980.

WORLDWIDE

The USA is the largest music market, followed by Japan with just under half of sales of the USA. Germany and Great Britain account for a quarter, followed by France. Before and after the Second World War, it was still common practice to record new versions of big hits from the USA and England for the national markets in the local language, but from the mid-1950s onwards, the original recordings became the norm. This meant that the original recording became the song that defined the style. The major US labels mentioned above dominated the global music market in the 1970s. In contrast, national productions from high-revenue markets such as Japan and France had little chance of success worldwide.

WESTERN EUROPE

After the Second World War, the national music industries were rebuilt. Many companies started afresh, some merged. It is noteworthy that the West German music market was completely restructured. Pre-war labels such as Electrola, Deutsche Grammophon and Polydor were reactivated, but new companies were also founded, such as Teldec, a joint venture between Telefunken and the British Decca. At the end of the 1950s, Bertelsmann built a pressing plant to supply its club business. When WEA came to Europe in 1970, it tried to work with national partners, but quickly concentrated on expanding a Europe-wide headquarters.

EASTERN EUROPE

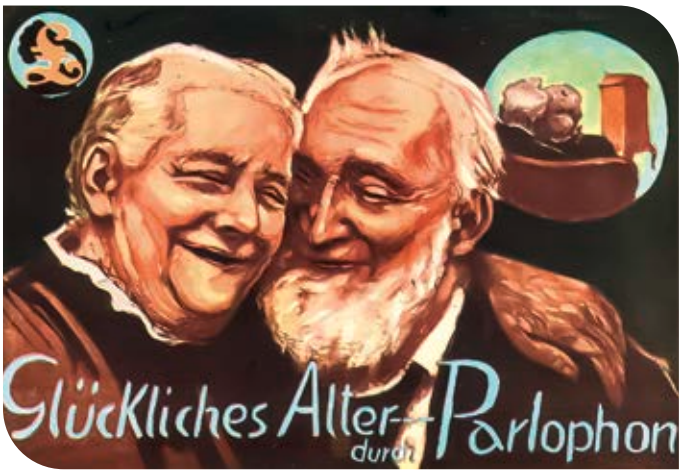
In the Soviet Union and its satellite states, state-run national record companies managed all aspects of music production, with censorship determining what could be recorded. Although most entertainment was locally produced, some licensed editions featured Western recordings, and major Western firms often collaborated on classical music co-productions in Eastern Europe.

PHASE ONE

Despite the market power of the US majors, RCA and Columbia were in crisis. As early as 1968, when the ban on foreign investment for Japanese companies was lifted, SONY acquired a 50% stake in Columbia. This gave them access to the entire catalogue and the technical infrastructure (studios, pressing plants). Twenty years later, SONY took over Columbia (CBS) completely. As already mentioned, PolyGram began buying up a large number of American labels in the US in 1972, which threw it into turmoil. MCA snapped up ABC (Paramount, Dunhill, Impulse). Chess and Motown were added later. MCA was bought by Japanese electronics group Matsushita (Panasonic) in 1989.

PHASE TWO

In 1995, Matsushita sold MCA to Seagram, led by CEO Edgar Bronfman Jr., who financed the purchase with DuPont shares. Bronfman had previously acquired stakes in Time Warner (1994) and PolyGram (1998), creating Universal Music Group. Jean-Marie Messier (*1956), chairman of Vivendi, a French conglomerate founded in 1853 as Compagnie Generale de Eaux (a water supplier), took over Universal in 2000. Bronfman focused on Time Warner, which merged with AOL in the same year. To reduce the debt burden, Warner Music Group (WMG) was sold to a group of investors led by



Bronfman in 2004. In 2006, EMI attempted to take over WMG, whereupon WMG wanted to buy EMI. In 2007, EMI was taken over by Terra Firma Capital Partners, led by Guy Hands (*1959), with a loan from Citigroup. The investor immediately transferred the purchase price ($4.7 billion) to the company. EMI did not recover from this and in 2012, the most traditional British record

company was split into three parts. The music publishing division went to SONY, while the sound recordings were divided between WARNER and UNIVERSAL following a decision by the EU Commission.

PHASE THREE

Prior to 2008, acquisitions were aimed at expanding the size of a record company. In 2008, Bertelsmann changed its approach. After four years of collaboration, Sony obtained Bertelsmann's share. A group of only 200 artists, along with their publishing rights and sound recordings, were transferred to a newly established company, BMG Rights Management GmbH. The new business received five years' funding from KKR, with the goal of achieving financial independence. This company functioned as a rights manager rather than a traditional record label. Its priority was to maintain the back catalogue and continue to support active artists. From 2014 onwards, this model became a blueprint for many investment funds. Today, powerful investors love to buy an artist's entire oeuvre, including all rights. The best example is Frank Zappa (1940-93), whose heirs sold everything, absolutely everything, to UMG: compositions, lyrics, all sound recordings including the recording archive, film, video, photos, the name, the brand (the FZ beard) and the internet domain.

PROBLEMS

Looking back, all companies were chaotically managed from 1975 onwards. Firstly, actual growth consisted of acquisitions. Secondly, CDs boosted profits by enabling back catalogue sales at high prices, which attracted investors. Thirdly, the abandonment of infrastructure (studio, pressing plant, distribution) wiped out traditional knowledge and active error management. Fourthly, the majors wasted more than ten years on digital copy protection, neglecting classic recording formats (LP, MC, single). Fifthly, basic music consumption is now secured by advertising-financed streaming services such as Spotify, in which the three majors already acquired a

financial stake in 2008. Sixthly, in the age of the internet, virtually no one needs physical recordings anymore; they are primarily a fetish, but also the icing on the cake.

SUMMARY

Numerous renowned (senior) artists or their heirs have now sold their entire works for large sums of money. The new owners, insofar as they are not majors, license the use to one of the three majors. This has advantages. For example, the two catalogues of the Rolling Stones, Decca (1963-70) and RS Records (since 1971), are now under one roof at Universal. Only Warner is still a US-based label; all other catalogues are owned by foreign companies. The United States continue to be the largest market, and decision-making primarily takes place there. Likewise, US guidelines and customs determine how the material is handled internationally. In fact, the rights to the recordings of Robert Johnson (1911-38) are now owned by a Japanese corporation.

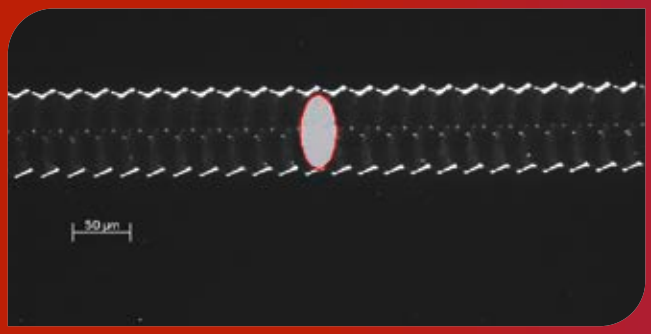
FORECAST

For the past ten years, the majors have performed according to their abilities. The Big Three dominate the market, are globally positioned and have a broad offering. The integration of ever new artist labels works just as well as their own A&R work. Unfortunately, the gap continues to grow. Only a few stars still receive a lot of attention. Physical recordings (LP, MC, CD) are currently regarded as awards. Releasing a new album is a noteworthy achievement. For many artists, selling their own LPs or CDs following a concert represents a significant source of revenue. In the current landscape, pressing companies that possess an extensive client base hold a distinct advantage. Key factors such as strong customer relationships, high-quality products, accurate production volumes, and transparent payment processes are essential for sustained success.

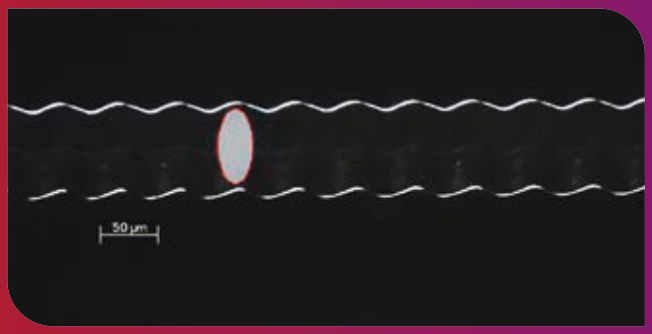
VINYL ISN'T JUST RETRO – IT'S A DIFFERENT BEAST ENTIRELY

WHY THE MASTER FOR WAX CAN'T BE THE SAME AS THE ONE YOU UPLOAD TO SPOTIFY

*By **Andreas Kohl***



A high-pitched signal inside the record



A high-pitched signal at the edge of the record

Vinyl records are enjoying a renaissance, but for many modern producers and mastering engineers – especially those who've cut their teeth on digital formats – the path from a finished mix to a playable, great-sounding record is not always clear. The tools and habits we've developed in the age of streaming don't always translate to the world of turntables, lacquer cutting, and mechanical groove geometry.

We've reached a point where we need to find common ground within the industry and create a shared understanding of what makes a master "vinyl-ready," without turning the conversation into a battle between analog purists and digital maximalists. We want to look at the physics, the workflow, and the listening experience, and find a practical middle ground that works for everyone - from the DIY home studio to the professional mastering suite.

The article that follows shall be our foundation. By the end of the discussion, we aim to have a shared vocabulary and a set of practical guidelines that anyone in the industry but mainly artists, labels and DIY engineers can apply to their own projects.

THE FRAMEWORK

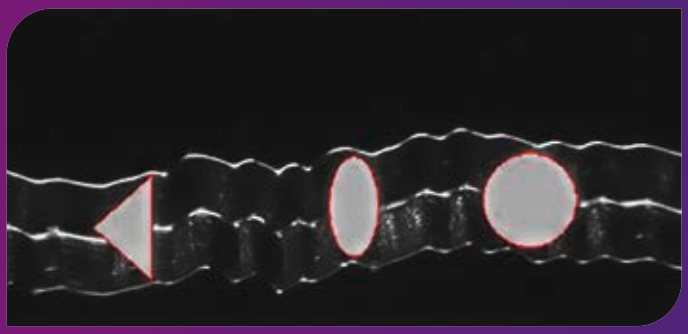
When you think of mastering, you might picture the last coat of polish before a record leaves the studio – the final EQ tweaks, loudness adjustments, and dynamics shaping that make a track ready for the real world. But here's the catch: "the real world" looks very different depending on whether your music ends up on a streaming platform, a CD, or pressed into a spiral groove on a slab of plastic.

A CD or streaming master is a digital file that lives in a world of bits and bytes – it's limited only by sample rate, bit depth, and the playback chain. Vinyl, however, lives in the physical world of a cutting lathe, a lacquer disc, a mechanical stylus, and ultimately, someone's turntable. The difference isn't just nostalgia – it's physics. And physics doesn't care how good your plug-ins are.

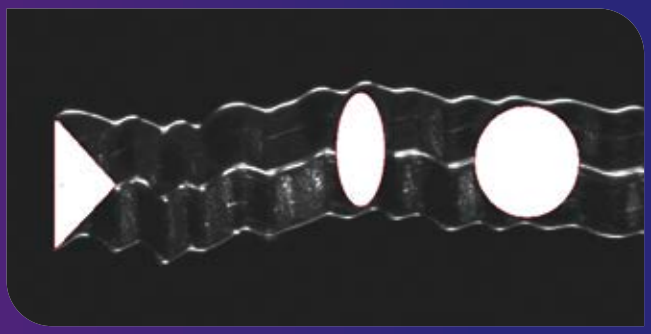
THE GROOVE DICTATES THE RULES

On vinyl, your music is literally carved into a spiral groove. The amplitude and shape of that groove are determined by your audio's frequency content, stereo imaging, and loudness. Push too much sub-bass, and the grooves get too wide. Add aggressive high-end transients, your music might distort in playback or the needle even skip. Because high-frequency distortion only shows up at playback, predicting it is a bit of a guessing game and considered an art form by more than a few – every turntable needle has its own quirks and breaking points. So, in mastering, it's worth remembering that the record should still sound passable even on a perfectly ordinary turntable, not just in the sacred halls of hi-fi.

For a CD master, you can slam the low end as much as you like. But vinyl grooves have limits:



Cutting tool and scanner in the groove



Cutting tool and elliptical and spherical scanner in the groove

Low frequencies are cut in mono. The term mono itself isn't perfectly correct here, rather describing the sounds kept tightly panned to the center. Instead of accurate terminology, the goal is more important: to prevent vertical stylus movement that creates wide grooves and limits the available space on the record and thus limits the playing time and will in return result in the need for taming the bass beast and bringing down the overall loudness.

Excessive highs – especially sibilance or harsh cymbal hits – can cause distortion because your tracking needle has to move too quickly in a tiny space.

Most cutting engineers use high-pass filters, elliptical EQs, or mid/side processing before the lacquer stage to tame these issues. If you don't prep your master with this in mind, they'll have to do surgery on your mix – and you may not like the results.

On a general note on everything we discuss here let's please agree on the following: limiting measures aren't the mastering engineer's evil scheme – they're just there to help make sure the record actually stands a chance in the real world.

LOUDNESS WARS DON'T WORK ON WAX

Streaming and CD masters often chase integrated LUFS levels between -14 LUFS (Spotify's recommendation) and as high as -8 LUFS for more aggressive genres. That's fine in the digital domain. In streaming, Spotify, Apple Music, and others normalize playback using LUFS as a reference. This is why integrated loudness matters so much in digital – it's about avoiding unintended level drops after normalization.

Vinyl playback has no such system. The loudness you hear is directly related to the cut level, cartridge output, and phono preamp gain. LUFS is irrelevant because nothing is "measuring" it during playback – the medium is purely analog.

Dynamic range is far more important than integrated loudness. Over-compressed waveforms:

- Cause groove modulation that's harder to track cleanly
- Increase distortion and reduce musicality
- Require more de-essing and EQ compromises during cutting

A vinyl master should focus on peak levels, crest factor, and dynamics because these determine how the groove behaves.

LUFS DON'T MATTER

Did we say that yet? LUFS is designed for digital audio, measuring the perceived loudness over time according to human hearing. It's perfect for streaming, where loudness normalization ensures one track doesn't sound way louder than another.

More importantly, LUFS doesn't account for the mechanical limits of the cutting head. Groove width, not perceived loudness, determines how loud you can cut. A bass-heavy track with a "safe" LUFS value can still be impossible to cut hot without distortion, while a midrange-focused track at a higher LUFS may cut perfectly fine.

LUFS weighting also ignores how certain frequencies stress the cutter head. In vinyl mastering, true peak level, crest factor, and spectral balance matter far more. Over-compressed tracks – often a byproduct of chasing LUFS in digital – tend to distort more and rob vinyl of its natural depth and liveliness.

PEAK LEVELS AND CREST FACTOR TELL THE REAL STORY

Instead of LUFS, vinyl mastering engineers care more about:

- True Peak: Should leave headroom (often -3 dBFS or more) in the pre-master to avoid overdriving the cutter head
- Crest Factor: High crest factor (more difference between peaks and RMS) generally plays nicer on vinyl
- Spectral Balance: Smooth, controlled low end and highs that won't cause mistracking

These correlate directly to the physical limitations of the tracking at playback, not an abstract loudness number.

SIDE LENGTH IS PHYSICS, NOT PREFERENCE

Digital formats don't care how long your album is – you can cram an hour of music into a playlist with no degradation. Vinyl is not so forgiving. Longer sides mean grooves have to be packed tighter, which forces the cutting engineer to reduce overall level and bass content.

A rough guide:

- **12" LP at 33⅓ RPM:** 18 - 22 minutes per side for optimal fidelity.
- **12" LP at 45 RPM:** 12 - 15 minutes per side but better sound quality.
- **7" single at 45 RPM:** 4 - 5 minutes per side tops.

THE RIAA CURVE IS YOUR FRIEND (AND YOUR ENEMY)

All vinyl records are cut with an RIAA equalization curve. In simple terms: bass is reduced and treble is boosted on the way in, then reversed during playback. This keeps grooves narrow and reduces surface noise.

Here's the catch: if your mix already has extreme EQ choices – huge sub-bass, brittle highs – the RIAA process can make those extremes more problematic. Your vinyl master should aim for a balanced spectrum so that the RIAA curve doesn't tip it into distortion or thinness.

SIBILANCE AND TRANSIENTS NEED SPECIAL ATTENTION

A digital master might let your hi-hats slice like glass and your vocals sparkle with sharp "s" sounds. On vinyl, those can become harsh distortion or even mistracking. This is because the tracking stylus can't accurately trace extremely rapid changes in direction without physical stress.

A de-esser or targeted dynamic EQ on vocals and cymbals can be your best friend here. The goal isn't to dull the mix – it's to make sure your playback cartridge doesn't have a panic attack.

Although excessively high frequencies may risk overloading the cutting head, the device will accurately reproduce all input signals up to that threshold. However, even levels well within its cutting capability can still provoke distortion in playback. The suggestion to limit here isn't about doing the cutting engineer a favor – it's about ensuring the resulting vinyl is actually fit for the market.

STEREO IMAGING: KEEP THE FOUNDATION SOLID

In the digital world, you can have wild stereo effects, out-of-phase low end, and swirling panoramas without worry. On vinyl, strong out-of-phase bass causes vertical groove movement, taking up space and potentially reducing volume unnecessarily.

That's why vinyl-ready masters often mono the bass (pan to the centre) below ~150 Hz, and sometimes higher depending on the track. Wide stereo in the mids and highs is fine – in fact, vinyl can sound beautifully spacious there – but the foundation must be solid and centered.

One step that should always be taken is removing all frequencies below 20 Hz. Such sub-bass content often appears unnoticed – particularly in fully digital productions – and serves no musical purpose. These subsonic signals can, however, trigger mechanical resonance in the tonearm-cartridge system, which in turn may lead to audible issues such as groove skipping.

COMMUNICATION WITH THE CUTTING ENGINEER IS KEY

For digital masters, you upload and you're done. For vinyl, the cutting engineer is your last collaborator. Supply them with high-resolution files (24-bit / 96 kHz), clear side splits and track order, and a detailed cue sheet listing timings so it becomes clear were ID grooves shall be cut. While not strictly necessary, providing one file for each side instead of separate tracks can help prevent unintended pauses or fades and ensures the final result matches the original intention. This approach also reduces the chance of track sequence errors. Clear communication with cutting engineers regarding sound and overall appearance can minimize the need for adjustments during production.

TEST PRESSINGS AREN'T JUST A FORMALITY

Your first vinyl copy will not be a retail copy – it'll be a test pressing. This is your chance to hear how your vinyl master behaves in the real world. If you hear distortion, low-end loss, or other artifacts, work with your cutting engineer to adjust before the full run.

Once 500 copies are pressed, fixing a mistake is very expensive. Think of the test pressing as your last mastering session – with a turntable.

DIGITAL AND VINYL MASTERS CAN COEXIST

Here's the good news: you don't have to compromise your streaming master just to make it vinyl-safe. Many artists and mastering houses prepare two separate masters – one optimized for the digital domain, and one for the analog groove.

The vinyl version may have slightly tamed highs, mono'd bass, more dynamic range, and lower overall loudness. The streaming/CD version can keep the punch and gloss suited for earbuds and car speakers.

If you give the vinyl the room it needs, you get the best of both worlds: punchy, competitive streams and a record that sounds rich, warm, and trackable.

THE TAKEAWAY

Vinyl-ready mastering isn't a matter of hitting a "vinyl preset" in your DAW. It's about understanding the mechanical limitations and unique playback characteristics of the format – and respecting them.

Think of it this way: a digital master is a JPEG – it can be bright, compressed, and perfect for screens. A vinyl master is a fine art print – it needs the right ink, paper, and spacing to truly shine.

If you master for vinyl with the groove in mind – controlled bass, tamed highs, reasonable side length, dynamic breathing room – your record won't just survive the cutting lathe, it'll sing on a turntable for decades.

And that's worth the extra pass in the mastering suite.

ORGANIZING TEAM

Making Vinyl Europe 2025

Bryan Ekus
Making Vinyl
President & Founder

Andreas Kohl
Making Vinyl Europe
Conference Director

Ruben Planting
Making Vinyl Assistant
Program Manager

Malissa Sole
Making Vinyl Social Media

Chuck Ono
Making Vinyl Asia

Bernhard Krause
Studio Krause
Managing Partner

Andrej Krause
Studio Krause
Managing Partner

Vivien Gollnick
Studio Krause
PR & Communications

Christiane Lenk
Studio Krause
Project Manager

Michaela Schäfer
Studio Krause
Graphic Designer

GROOVE CONTROL: THE EVOLVING ROLE OF COMPUTERS IN VINYL CUTTING

*By **Andreas Wagner***

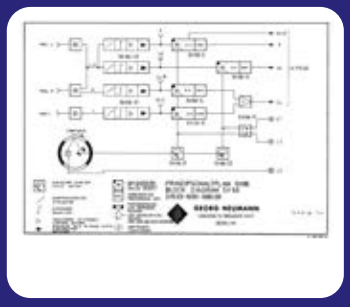
'Digital' in the vinyl world is like broccoli on a kid's dinner plate – always on the side, never the main choice, and often pushed around without being touched.

Although digital technology has dominated music production for the past three decades, it remains misunderstood, dismissed, or criticized within the record-cutting community. Yet behind the scenes, digital systems have supported the craft of record cutting since the 1970s – and the capabilities of modern digital signal processing may help this historic analog format evolve and thrive. Let's take a look back.

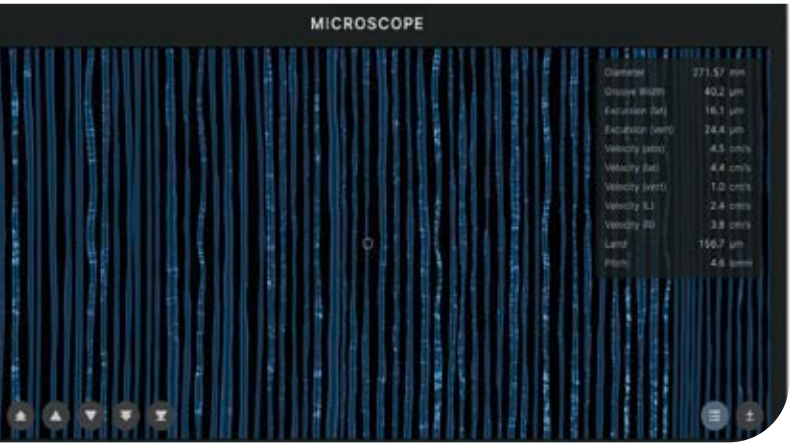
COMPUTER CONTROLLED DISK MASTERING LATHE

The introduction of computers into the domain of vinyl mastering did not occur abruptly or with great technical fanfare. Rather, their integration happened gradually and discreetly, woven into existing analog practices by engineers seeking ever-greater precision and control.

'Computer Controlled Disk Mastering Lathe' was the bold title Neumann gave the 'Installation, Operation and Maintenance Manual' for their VMS 66 system in September 1969. The word 'digital' appears nowhere in that document – but make no mistake: the SV 66 control electronics introduced a first-generation pitch computer, using discrete, analog transistor logic.



All pictures © Andreas Wagner



Instead of requiring the engineer to manually adjust groove pitch during the cut, the lathe now responded to the audio signal in real time. This automation enabled more efficient use of disk space and greatly improved consistency between cuts, giving the VMS 66 – and its successor, the VMS 70 – a clear advantage over competing systems.

A decade later, in 1978, the Neumann VMS 80 marked another turning point. It introduced full digital control with a "digital dynamic memory" operating at 4 kHz sampling rate. This memory stored the preview signal for one full revolution, enabling the newly developed 'Varigroove' pitch algorithm to achieve highly efficient groove packing. A new 'dynamic depth' control system compensated for phase-related issues, while the optional 'auto echo' function helped suppress unwanted pre- and post-echo artifacts.

Although the Neumann engineers modestly noted that their innovation was "unlikely [to create] program lengths […] significantly greater than with the previous one", it became the foundation for most aftermarket pitch control add-ons developed for older lathes and remains the gold standard in groove packing to this day.

In the same 1978 paper, "A Real-Time Digital Processor for Disk Mastering Lathe Control", the Neumann engineers also discuss an alternative approach to pitch automation:

"One solution involves storing all the control signals needed for an entire record side in the memory of a computer, processing this information in a suitable manner, and retrieving from the computer a control signal that

will operate the lead screw throughout the cutting process. […] [This] solution would have the advantage of provision a readout of the exact space requirements, but it would need an additional processing step; the entering of the information. […] We opted for the [other] method, for we wanted to avoid the additional, time-consuming, and therefore uneconomical processing step."

From a 1978 perspective, digitizing and preloading control data for an entire side understandably seemed impractical. But what if all that information was already in the computer?

VIRTUAL GROOVES

Fast forward to today. Advancements in technology have led to computers that are significantly more compact and equipped with gigabytes of memory, a substantial increase from the kilobytes available in 1978. Where Neumann's engineers once weighed the tradeoffs between real-time and precomputed control, the exponential growth of computational power and memory has radically altered the landscape.

At the May 2019 Making Vinyl Conference, Rebeat Innovation launched Perfect Groove, a software that embraced the second approach Neumann had once rejected. Instead of reacting to the audio in real time, Perfect Groove precomputed the complete set of control signals a VMS 80 would generate for a given audio program. This allowed quick recalculations – adjusting parameters now took seconds, not a 20-minute test run.

Perfect Groove was not designed to drive a physical lathe, but instead used a 'virtual lathe' to build a precise geometric model the groove based on the audio material and cutting parameters. This 'virtual groove' allowed engineers to assess whether a cut would work before using the actual cutting stylus.

Working with a virtual groove opens up possibilities beyond just pitch control optimization. A basic analysis of geometric parameters such as groove depth, lateral excursion, remaining land and required disk capacity offers a quick assessment of program feasibility. More advanced calculations of dynamic properties like stylus velocity can reveal potential playback distortion or the risk of overheating the cutter head. Simulating the exact stylus motion within the groove could even enable audible virtual playback with different stylus profiles – no test cut required.

While Perfect Groove was designed as a stand-alone tool to model a full side at once, the 2022 release of the Simulathe plugin by Tokyo Dawn Records brought a different approach. Fully integrated into the mastering DAW, it generates a virtual groove from a master track, allowing continuous analysis of groove geometry and dynamic behavior. In addition, it offers corrective filters and limiters to address groove issues on the spot.

BRINGING IT ALL TOGETHER

Although Perfect Groove and Simulathe offer strong diagnostics and visualization, they fall short of the Neumann engineers' "one solution," as they only operate their internal virtual lathe rather than controlling a real machine.

An example of complete integration is Space Time Control, developed for the Sillitoe Disk Mastering System. This stand-alone application converts digital master files into a virtual groove and, unlike other solutions, uses its virtual lathe to generate control signals that directly operate the physical lathe. While Perfect Groove and Simulathe assist the engineer to configure an external system, Space Time Control independently manages the entire cutting process from lead-in to lock-out.

Given that most modern masters are now delivered as digital files, this degree of integration represents a logical progression. Systems capable of providing accurate groove analysis and previews mark a significant improvement in quality, consistency, and turnaround time. Furthermore, recent demonstrations of integrated software and hardware controllers suggest the potential for broader industry transformation.

Given the tools available today, testing different parameters through real-time dry runs or multiple test cuts feels like the "additional, time-consuming, and therefore uneconomical processing step" the Neumann engineers were striving to avoid with their solution back then.

Modern digital technology is ready to assist – not replace – the world of analog cutting. From groove emulation and analysis to objective quality control of records, digital tools are waiting to be embraced, not sidelined.

THE GROOVE BEFORE THE GROOVE
WHY TEST PRESSINGS ARE THE UNSUNG HEARTBEAT OF VINYL PRODUCTION

*By **Andreas Kohl***

You can smell it before you hear it – the faint hint of PVC, the crisp edges of a fresh white label. A test pressing doesn't come wrapped in shrink or dressed in album art. It arrives naked, fragile, and full of expectation. To the untrained eye, it may seem like just another black disc, maybe even a throwaway. But for the artist, the mastering engineer, and the label that's waited weeks – sometimes months – it's everything.

DEMYSTIFIED: PURPOSE, PROCESS, AND PITFALLS

In the intricate world of vinyl production, the test pressing holds a critical, often misunderstood role. It's not merely a quality check or a ceremonial step before mass production – it is the only moment in the entire manufacturing process where sound, setup, and artistic vision align for scrutiny before a record goes to press.

Test pressings are not about guaranteeing the final pressing quality or catching every flaw a factory could introduce. They are not evidence that a pressing plant has "done its job." Rather, they are a vital opportunity for artists, labels, and engineers to hear how their creative work – the master – translates into physical form. Played on different turntables – in various home and studio setups, test pressings reveal how frequency, dynamics, and stereo width survive the transition from studio to groove. They expose how a master behaves when moved through the analog cutting chain and pressed onto vinyl. Most crucially, they highlight if anything has gone wrong in the mastering or cutting stage.

Their value goes beyond sound, too. Test pressings are the only chance to verify whether side splits, track orders, engravings, and indexing grooves are accurate. They also provide the rare possibility to spot technical issues in the metalwork – imperfections embedded into stampers that would manifest identically across all test pressings and are often easily detectable by ear or eye. They are rare, but when found, they allow for early intervention before mass production, saving both time and reputation.

And yet, the test pressing is not a product. Product liability and warranty laws do not apply to it. This is important and often overlooked. It's a tool, a service, and in its physical nature raw, unpolished, and sometimes imperfect. It may be slightly warped, might pop or crackle a bit more than a finished record, and won't have undergone the rigorous QC of a commercial run. But that doesn't lessen its value; it reinforces its purpose. Imperfections in playback are expected in test pressings and are not cause for complaint. Pressing plants have a responsibility to deliver flawless final products, and any faults found in the main run can – and must – be addressed. But test pressings live in a separate category: one of evaluation, not execution.

And this distinction is vital: pressing-related imperfections on a test pressing are not grounds for a claim. That's not because they don't matter, but because the test pressing isn't the product. It is a reference tool to evaluate how the master translates to vinyl, not a benchmark for pressing quality. The final product is being manufactured independently at a different time and in a different setup. Both manufacturing processes bear no connection whatsoever.

In fact, it should be recognized that the factory personnel performing quality control on commercial runs are often more experienced and specialized than the customer reviewing a test pressing. Their daily work involves detecting even the most subtle faults across hundreds of records. These operators, sound checkers, and visual inspectors are trained professionals – equipped with the knowledge and tools to ensure the production run meets a much higher and more consistent quality threshold than any one-off test. With that in mind the focus for checks on test pressings relates to and shall emphasize on issues that QC personnel wouldn't be able to detect, like subjective impression of sound, track sequence, etc.

If a test pressing exhibits flaws that do not appear identically on all copies, they are most likely minor pressing anomalies that would not survive past the plant's QC team. That's their job.

What also needs to be understood is the legal and technical framework surrounding test pressings. These records don't fall under typical copyright or sales regulations. They aren't trade products and remain legally the property of the pressing plant. Selling them without proper clearance breaches copyright laws and misuses their intended function. If a label wants promotional or sellable versions, white label records must be ordered explicitly.

SO WHY DOES ALL OF THIS MATTER?

Because vinyl is not just about music – it's about trust, fidelity, and craftsmanship. It's about respecting the chain of creation, from the mastering engineer's meticulous balance to the artist's final nod of approval. The test pressing is the last checkpoint before a record becomes real. It's the moment where technical precision meets emotional resonance. It's when the record stops being data on a screen or sound waves in a DAW and becomes a tangible object – one that spins, sings, and carries intent. And it's the only way for an artist, label, or engineer to hear what a final record will SOUND like – something that cannot be emulated before due to entirely different signal chains.

But above all, let's repeat: a test pressing is not a product. It is not covered by warranty, nor does it serve as proof that a pressing plant has met its obligations. Test pressings are not made to evaluate the pressing quality itself. They are a tool, provided solely to evaluate how the approved master translates onto vinyl.

In a medium as delicate and celebrated as vinyl, every groove matters, every second counts. Test pressings, then, are not a formality – they're an act of care, of due diligence, of love.

They matter because the music matters.

THE PRINTING COMPANY WITH ..

TRUSTED PARTNER FOR ALL YOUR CREATIVE VINYL ARTWORK

Nijverheidsweg 1, 2031 CN Haarlem, The Netherlands
Phone: +31 (0)23 - 55 333 42 www.stylemathot.nl **E-mail:** dennis@stylemathot.nl

StyleMathôt
DÉ DRUKKERIJ MET EEN eigen stijl

MAKING VINYL RETURNS IN 2026 USA & EUROPE

More information soon at

www.makingvinyl.com