


Electroplating for Vinyl Record Production

Making Vinyl – Haarlem, Netherlands 2023






It's about
replication +
mass
production



McClure's—The Marketplace of the World


EDISON AND HIS PHONOGRAPH IN 1888



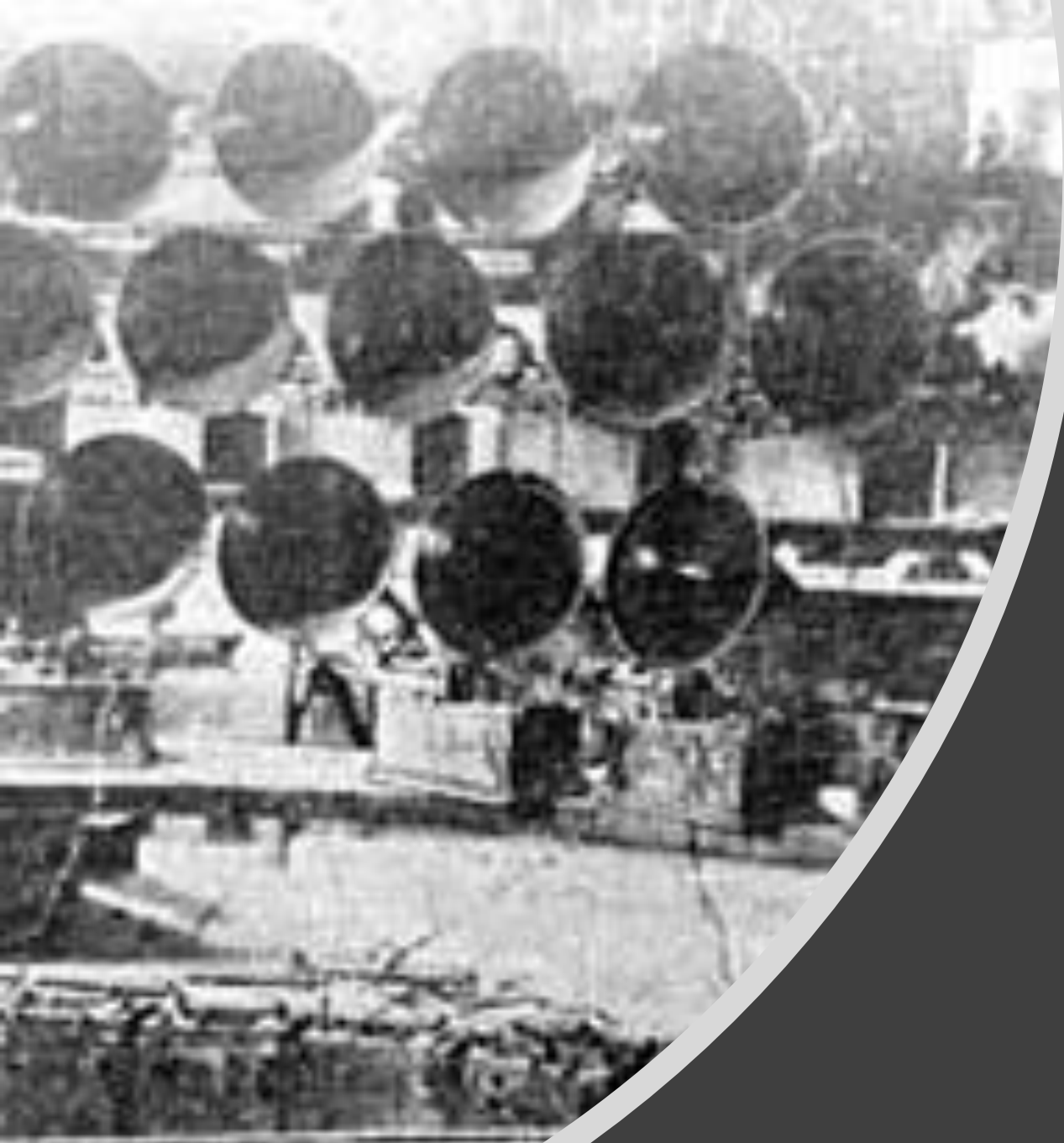
Copyright 1910, Harper & Bro.

The EDISON
PHONOGRAPH

IN 1911

A smaller, more compact Edison phonograph with a black horn, sitting on a wooden base. The horn is a smaller, flared black cup. The machine is black with a prominent orange-brown cylinder. It is shown from a three-quarter view, highlighting its intricate mechanical details and the polished wood of the base.





Mass Production?

1914 A CASE ENGINE WITH





Early Discs

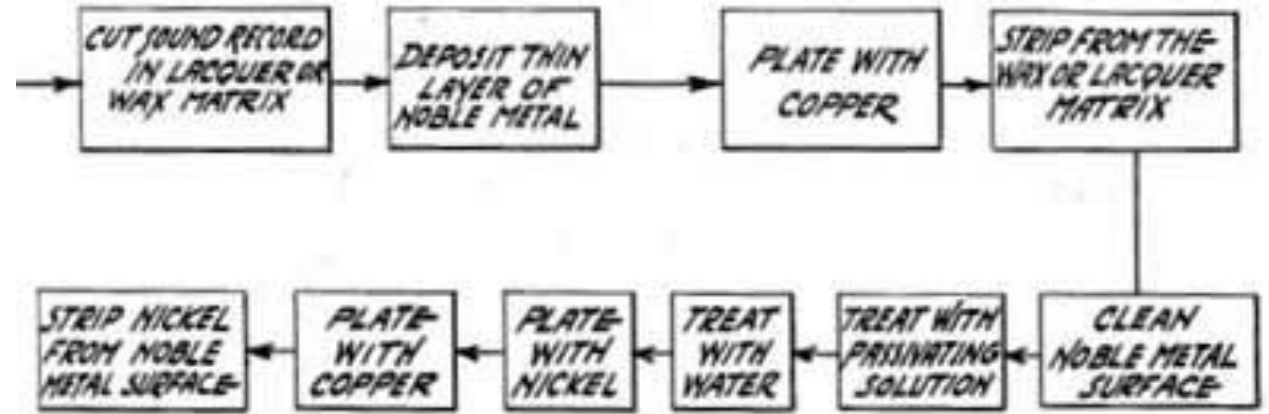
Emile Berliner

An early Berliner disc



The Original Audio Format War





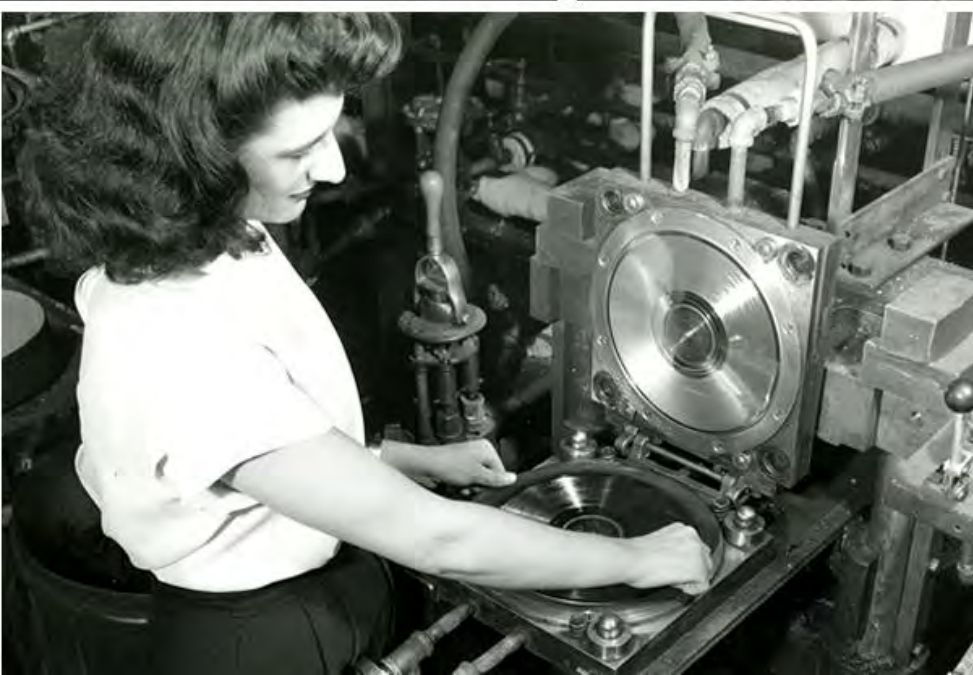
The above information is from a 1914 Edison patent application for disc recordings processes.

It looks quite similar to today's stamper plating methods, although copper is not used.



By the 1940s, record manufacturing methods were pretty well standardized, and almost identical to today's methods in terms of process and chemistry.

Everything Old is New Again!





A vinyl record is pressed using a metal mold known as a stamper.



The process starts with the lacquer master, etched with the analog sound waves from tape or in some cases, a live performance.

The musical content of the lacquer is equivalent to the vinyl end-product; but to get there it is used to create an inverse replication in metal, the stamper.

Assuring the quality of the stamper is mission critical to the quality of the vinyl end-product.



This stamper is created through a multi-step electroplating process that forms an exact mirror-image of the three-dimensional sound patterns etched into the lacquer grooves.

Steps to Vinyl Production

Lacquer Master

Metal Stamper

Pressing

Alex Abrash (AA) Mastering

Plainview, NY
Mastering only



Mastercraft Plating

Desmond Maraine,
(Elizabeth, NJ)

Stamper plating only



Third Man Records

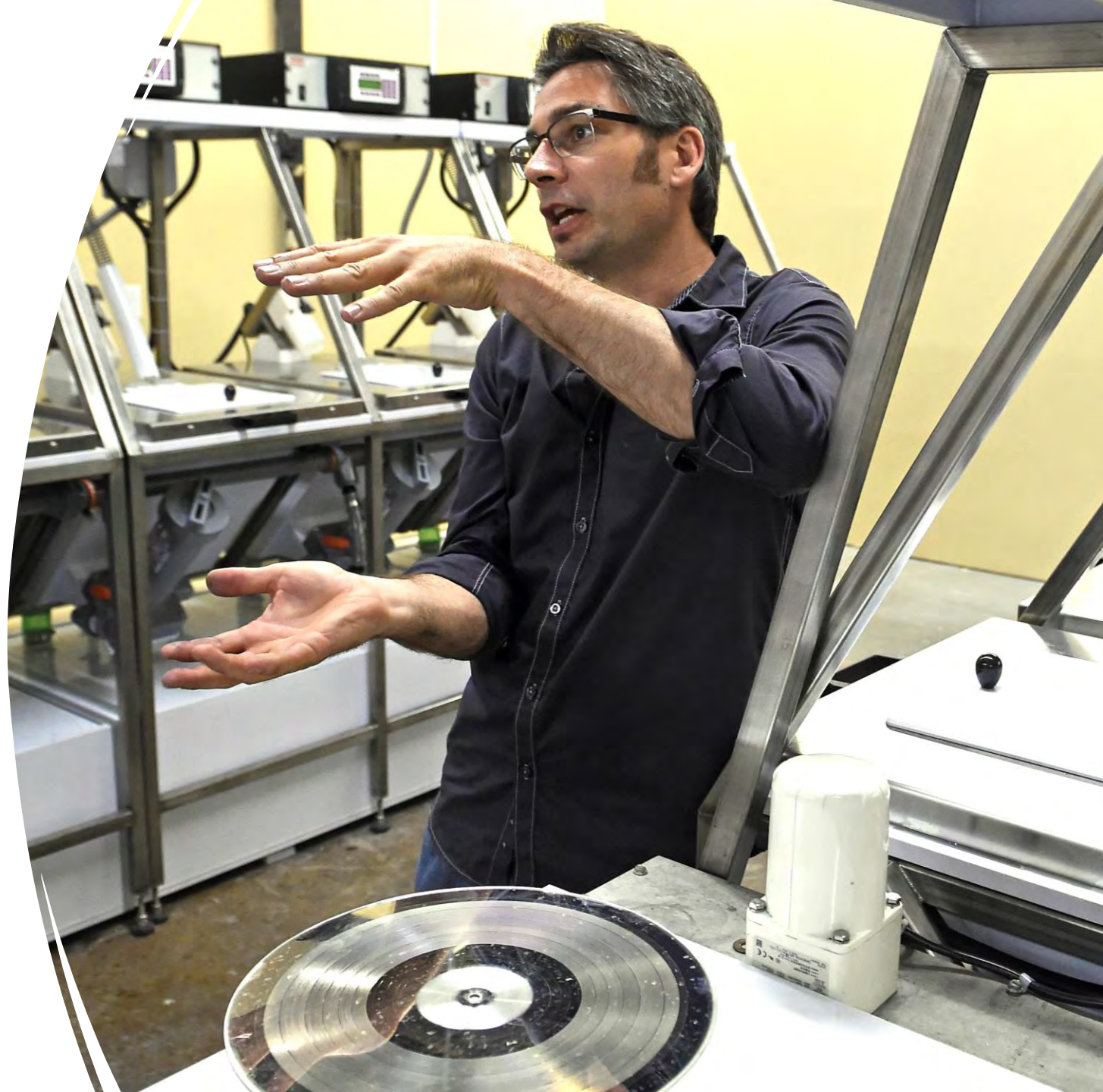
Jack White, Detroit

Studio mastering + pressing

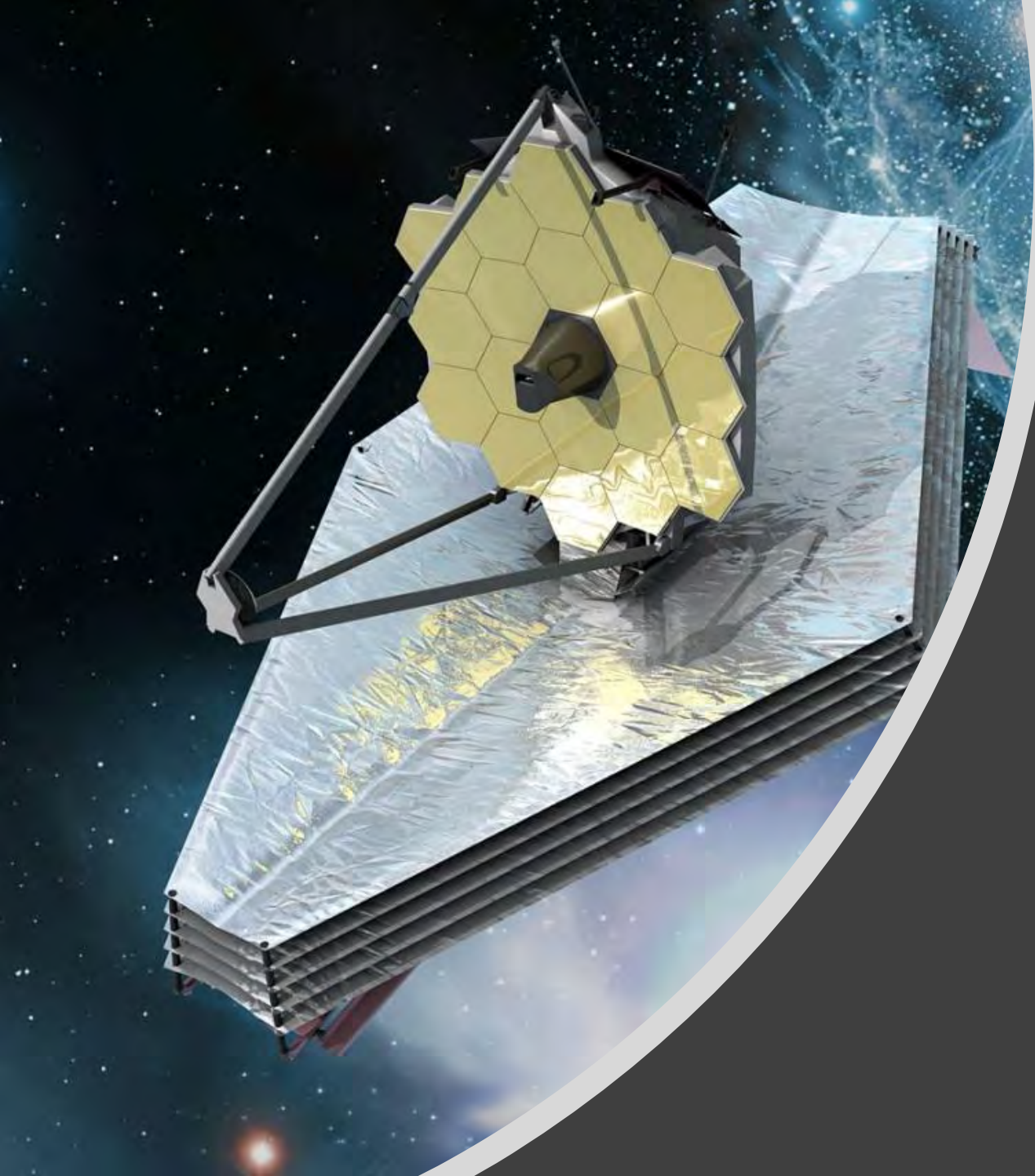


Welcome to 1979

Chris & Yoli Mara, Nashville
Studio mastering + stamper plating



What is electroplating?
(or more precisely, electroforming)

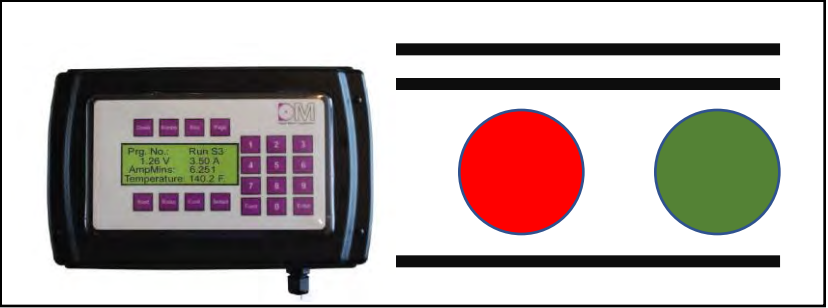


By the way...

Electroforming is also used in some of today's most cutting-edge nano technologies...

- Microchips
- Holographics
- Medicine
- Optics used in space telescopes, 3-D gaming, defense
- Optical media – e.g., CD, DVD injection molds

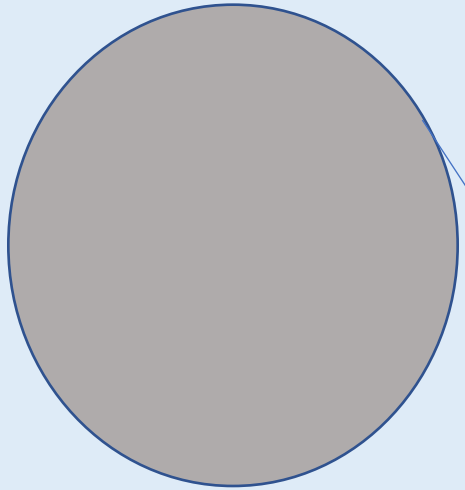
And yes for making those old-time vinyl records...



DC POWER SUPPLY

CATHODE
(Disc with conductive layer)

ANODE (Ni S Pellets)



ELECTROLYTE SOLUTION

Manufacturing
at the atomic
level

Main (Fast) Platng Cells (Welcome to 1979)



Molecular transfer of an element to a conductive surface.

- **Nickel (Ni)** is the element of choice for stampers
 - Durable and resists corrosion. Super high melting point
 - Plentiful on earth – most ubiquitous element
 - Relatively inexpensive (currently ~€9/pound
 - But pricing can be volatile – think Russia, a big source of Ni





VALE

10SP0771A

NICKEL S-PELLETS

Made in the United Kingdom

NET CONTENTS: 5x 10 kg bags: 50 kg

Vale Europe Limited



NICKEL METAL 100 PPM
50 kg
10 SP 0771 A
MADE IN THE UNITED KINGDOM
VALE EUROPE LIMITED
LONDON, ENGLAND

Steps to Plating

Silvering - creates a conductive seed layer on top of the lacquer

Pre-Plating - sets down a first layer of nickel at lower temperature ~40C ~20A 10-20u

Fast Plating – final nickel deposition to form first stamper or “father” ~55-60 ~180A 120u

Family plating – additional stampers from original for production scale & backup

Finishing

Silvering the Lacquer

Because nickel cannot plate directly onto the lacquer, the disc must first be coated with a conductive “seed layer” of silver.

The Digital Matrix silvering booth provides an automated spray that provides a precise application of silver nitrate solution to each disc.

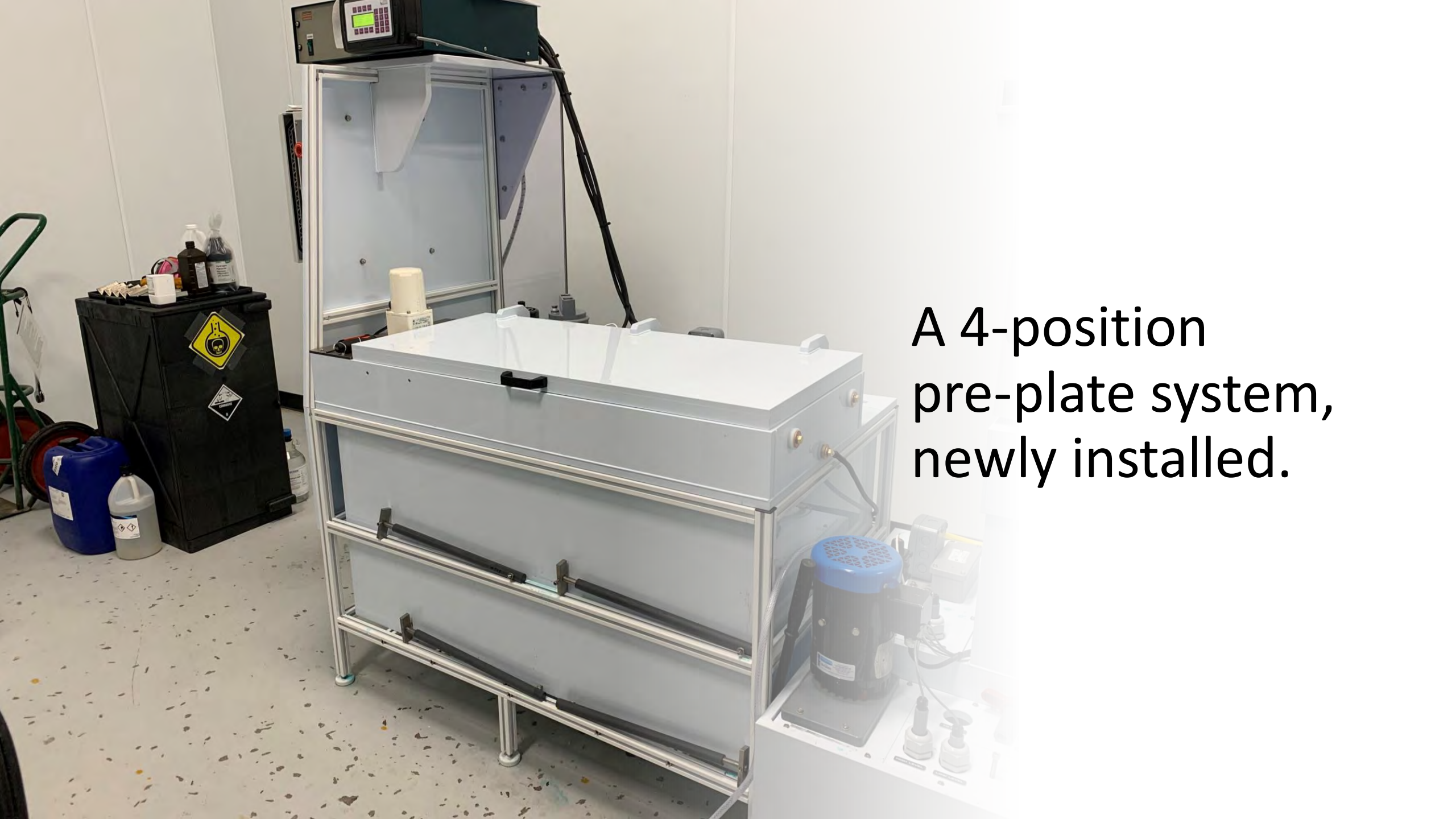




SILVERING SYSTEM



SILVERING SYSTEM



A 4-position
pre-plate system,
newly installed.





Silvering Prep Station

+



Pre-plating tank

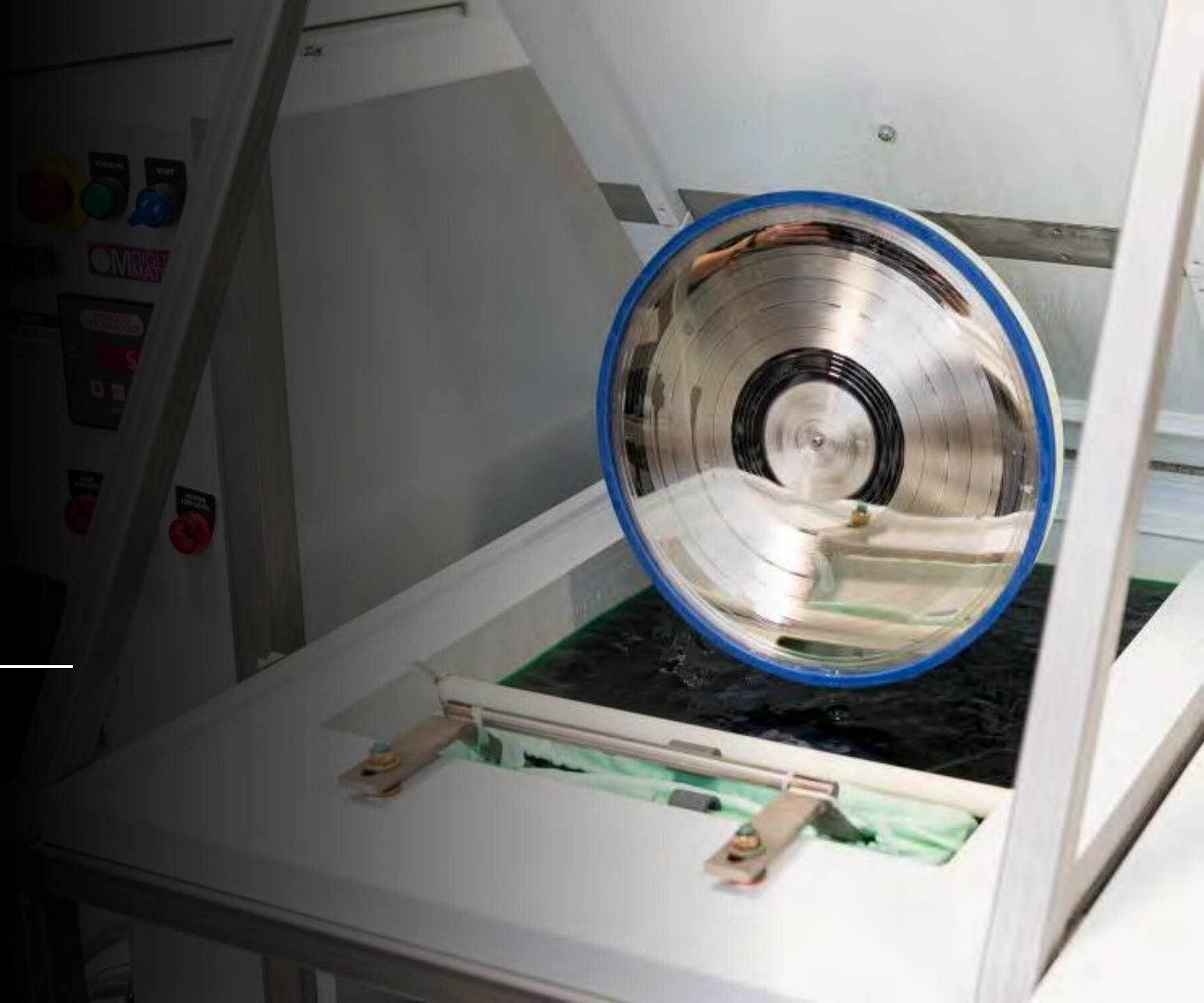
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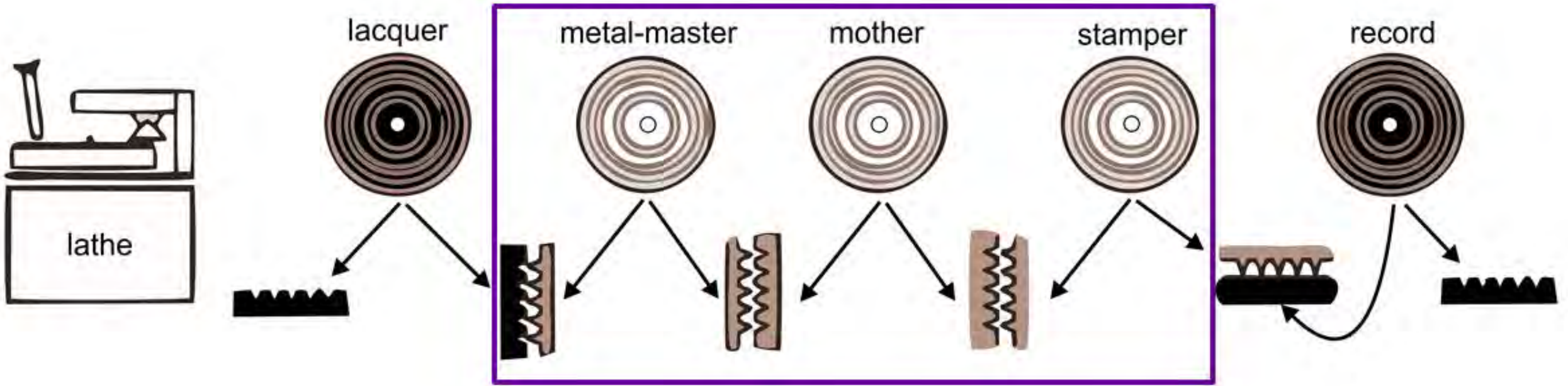


Fast plating cells



Out of the
plating bath...





It's all in the family! Multi-generational plating is required for production scale and archival "insurance."





SILVERING & PREP



PRE-PLATING



FAST-PLATING

ELECTRICAL: 3-PHASE 203-208 V
SUPPLY OF DI WATER
WASTE REMOVAL

FINISHING & PRESS PREP
ROOM

How much is the investment?

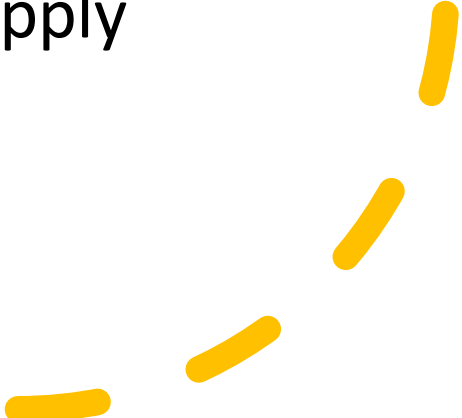
- The outlay for plating equipment, not including finishing tools, will start in the neighborhood of €180K and can easily exceed €250K based on the specific systems and capacity purchased
- Chemicals not included – app. €10K for start-up



ROI Calculations?

- How much does it cost to produce 2 stampers?
- We don't know! (exactly), but we estimate, based on a recent calculus we worked up for some investors, that the plating material cost will end up between €60-90 per album side stamper. That is based on a full 3-step plating operation ending up two stampers to press about 1000 albums
- Currently a single stamper goes for around €200 selling price (varies widely)

Operational Considerations

- After start-up, process chemical costs are low – low consumption rate
 - Nickel is **the** major consumable – every ounce purchased is consumed 1:1 with the amount used in each plated disc
 - Labor required is minimal – two competent technicians can generally handle all of the plating and finishing activities
 - Good ventilation and DI water supply required
- 



Environmental concerns?

- Yes, but not all that onerous
- The main plating cells are basically closed systems that require replenished water levels but very little chemical adding
- The main focus for handling waste will be in the silvering area
- See list of chemicals used in accompanying notes
- The word “plating” will raise red flags in many jurisdictions, but in most cases can be addressed satisfactorily with reasonable waste removal measures for chemicals used.



Invest in plating?

PRO

- Maximize operational efficiency if you plan to press vinyl at scale
- Eliminate a major bottleneck for your production schedule
- Control quality in-house
- Potential for additional revenue streams as a plating provider – high barrier to entry keeps competition low and demand exceeds supply

Invest in plating?

CON

- Major capital investment – weigh ROI potential with great due diligence
- Operational challenges – this is an every-day industrial activity
- Uncertainties of investment in a niche market dependent on consumer demand and supply-chain economics
- Finding a reliable plating vendor who can meet your production requirements may be a better option



Q&A

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