



"YESTERDAY'S CHARM, TODAY'S PRECISION" **MARTIN B. KANTOLA AND THE DESIGN OF A NEW 'CLASSIC' MICROPHONE**

DR ANTTI SAKARI SAARIO

"Music Production: International Perspectives" - Innovation in Music Conference 2022
Royal College of Music, Stockholm, 17-19 June 2022

FALMOUTH
UNIVERSITY



**Academy of Music
& Theatre Arts**

PRINCIPAL RESEARCH QUESTIONS

- > What produces innovation in microphone design?
- > What 'produces' a (new) classic studio microphone?
- > What informs Kantola's designs and where and how innovation takes place in his work?
- > How does innovation in microphone design feedforward to the audio production 'chain' (e.g., artist-microphone interaction, recording technique, changes in workflow)?
- > What are the hallmarks of quality in microphones, according to Kantola?

PART 1

MARTIN KANTOLA
NORDIC AUDIO LABS

FALMOUTH
UNIVERSITY



Academy of Music
& Theatre Arts



Martin B. Kantola: sound engineer, inventor and transducer and electronics designer

- > Sound engineering 1990-2011 (incl. Björk)
- > Met the late Bruce Swedien who became his "mentor" and "guru" at Sibelius-Academy, Helsinki in 1992
- > Produced the first NAL microphone NU-47 in 1997
- > Taught at the "In The Studio With Bruce Swedien" residential recording workshops (2007-2010) and co-designed the SWE#1 mic in 2009 with Swedien
- > Amphion 2011-2019 full-time and now as a consultant
- > Commenced NU-100K design in 2016 in relation to a commission to create a set of microphones for the orchestra recording of the sound track for *Tuntematon Sotilas* (2017)



NU-47 USER COMMENTS

'WOW!!! What a microphone!!! The NU-47 is an extremely high quality, prototype Microphone designed and built by my good friend Martin Kantola [...] Both Martin and I are fascinated by the Art of Microphone Design. The basic concept behind the NU-47 was to make the most capable hyper-fidelity microphone possible, designed expressly for the recording of featured Solo Sound Sources in modern music recording.

Of course, it's a fantastic vocal microphone. There have been only three NU-47's made. One was made for Icelandic singer Björk, who absolutely loves the sound of this incredible new microphone. She told us that, "It captures both the small and the big sounds that I make!"

(Bruce Swedien, 2006, Gearspace Interview)

NORDIC AUDIO LABS

THE COMPLETE "BACK CATALOGUE"

NU-47 (1997)

SWE#1 (2009)

Black Pearl (2010)

NU-49 (2011)

NU-880 (2012) ('panphonic surround microphone')

NU-47V, NU-47VPQ, NU-47C (2013)

NU-100K (2019)









Amphion Presents: Eva & Manu // "I've Learned" @ Nordic Audio Labs
https://youtu.be/PPoUIs_bKL4



amphion[®]

beautifully honest



"Amphion Two18 - our flagship studio monitor - can be found on every continent bar Antarctica.
Choice #1 for many composers, sound engineers, and producers."
(Amphion, April 20, 2022, Facebook)

PART 2

"THE DARK FOREST"

FALMOUTH
UNIVERSITY



Academy of Music
& Theatre Arts

GOING BACK TO GO FORWARDS IN "NU" WAYS

Neumann U47, early capsule designs and "ears first"

- > U47 as an inspiration and what is "behind" the classic sounds - "match the experience" - and not copy but "discover what was lost and could be extended"
- > 'Anti-romantic' (no nostalgia) but curiosity towards understanding the context and dynamic, continual learning, testing and discovery and integration of learning, with respect to what has been done before and with the view to find "nu ways" out of the forest
- > "They had to rely on their ears" early on and "the listening experience played a huge role" before measurements started to take over.
- > George Neumann visit at Microtech Gefell (Georg Neumann & Company Gefeff) and the path to "full disaster"
- > Design decisions and how choice does not equal compromise (incl. cost factor) (e.g. how much boost, what type of distortion?)

“It is not ‘bring back the warmth’ but do not lose it in the first place”

(Kantola, 2022)

PART 3

PARADIGM SHIFT
THE DESIGN AND
BUILD OF NU100K

FALMOUTH
UNIVERSITY



Academy of Music
& Theatre Arts

NU100K DESIGN GOALS

"Yesterday's Charm, Today's Precision"

- > Understand the affordances and constraints of the classic models (U47 and ELAM 251) and microphone types (condenser-ribbon) for an 'and' microphone
- > Move beyond financial limitations and transcend historical limitations (incl. technical)
- > Support, clarity, warmth, "silky top end" (w/out tube or transformer) and extended frequency range (akin to ELAM 251)
- > No strong pre-shaping sound to enable "shaping" at recording and/or mixing stage
 - > The importance of the capsule and ability to fine-tune it as desired "as you cannot get rid of the 'pre-EQ' tone with EQ"

CHALLENGES // INNOVATION

Disruption and innovation as a result of 'challenges' and a 'must'

- > The aim was to be as self-contained as possible and to have a 'closed system' that enabled to have an idea and then remain with it and test it 'immediately' and not have to rely on other people either for machining, tweaks/revisions, and/or comments from studio users.
 - > Acceleration (shrinking overall development time) and total commitment: no RND finance for 3 years, hardship and no option to fail
 - > Upskilling to be able to design and produce microphone capsules (CAD, CAM for CNC machinery)
 - > Establishing the context that enables rapid prototyping and 360° 'production' (i.e. full immersion) and two independent 'machinery' stratas: (1) build and (2) production
 - > Working with DFM (design for manufacturing) principles in mind and with 'narrow path' learning
- > Enabled the foregrounding of 'experiential' fine-tuning, and the balancing of contextual listening and measurement based work

FUTURE PLANS CONCLUDING NOTES



DEDICATION TO EXCELLENCE

According to Kantola there is no such thing as perfect sound, but it is, nevertheless, an eternal quest (Luukkanen, 2011), and he has made the strategic decision to compete in the global microphone market solely on the basis of a notion of 'quality' (Haavisto, 2017).

Driven by this 'quality', Kantola's career is a testament to what Swedien calls his "dedication to excellence" (Grönholm, 2010).

III (2021) ALBUM BY EVA + MANU

- > Options afforded for tracking and mixing
- > Only used SM57 for some guitar overdubs that wanted to be 'narrower' but everything else was recorded with the NU-100K or the Black Pearl
- > Ease of mixing and malleability of sound
- > Extensive use of layering (e.g. 5 simultaneous piano recordings)
- > 'Adding character' to recorded signal in digital domain
- > Single microphone enabled workflow efficiencies as was able to have microphones ready to go at all times

[Coffee with Manu Laudic \(2020\) YouTube](#)

