

NF Wire Forum

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Metals for Progress

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Agenda

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Influencing factors in the fine wire drawing process

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Deutsches Kupferinstitut Berufsverband e.V.
neutral - competent - interdisciplinary

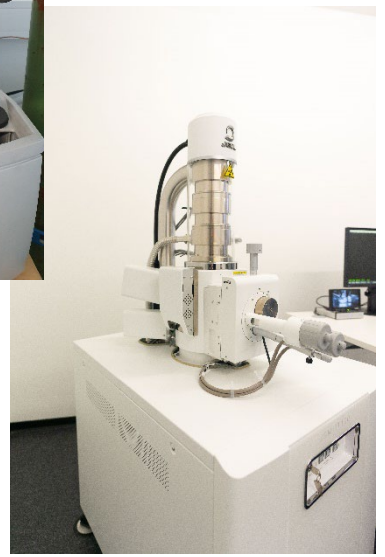
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- ✓ **Representing** the interests of the copper processing industry
- ✓ **Consulting** on materials, applications and processing
- ✓ **Knowledge transfer** through publications, lectures, training, networks
- ✓ **Laboratory services** within the scope of engineering analyses
- ✓ **Research** on pre-competitive issues in cooperation with industry and universities









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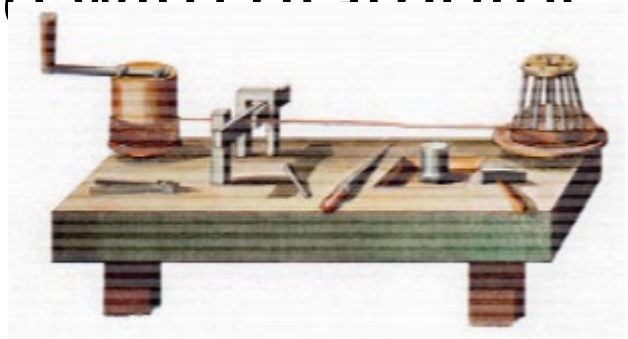
Preamble / History

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9000 years ago: first wires made of copper materials by stamping and cutting into thin strips

2000 years ago: first drawing dies for drawing wires

With the further technical development, the wire diameter also became thinner and so the diameter range of so-called fine wire also changed.



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1. Definition of fine wire and drawing capability
2. KPI in the fine wire drawing process
3. Factors influencing the drawing process

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Definition

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Fine drawability is

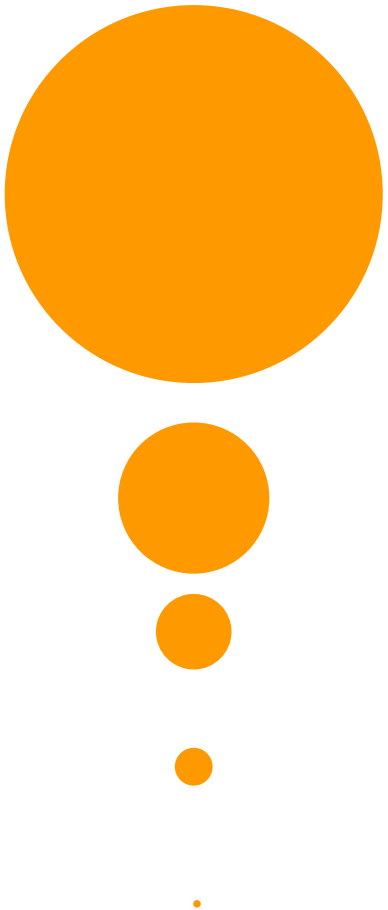
the suitability of a pre-material and / or a drawing process to produce wires of a certain quality below a certain diameter with sufficient process reliability!

= Process reliability

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Definition fine wire – Where does it start?

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< 0,500mm ?

< 0,200mm ?

< 0,100mm ?

< 0,050mm ?

< 0,006mm ?

Drawing machines by -∅:

Breakdown: 4,5 - 1,0 mm

Intermediate: 1,5 - 0,35 mm

Fine: 0,5 - 0,10 mm

Ultrafine: 0,15 - 0,05 mm

Literature: „opper wire drawing“ by Martin Herzog

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Drawability KPIs

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weight / per break (e.g. in t, 100kg, kg)

production length (e.g. in m, km)

effective produktion time (% of planned time)

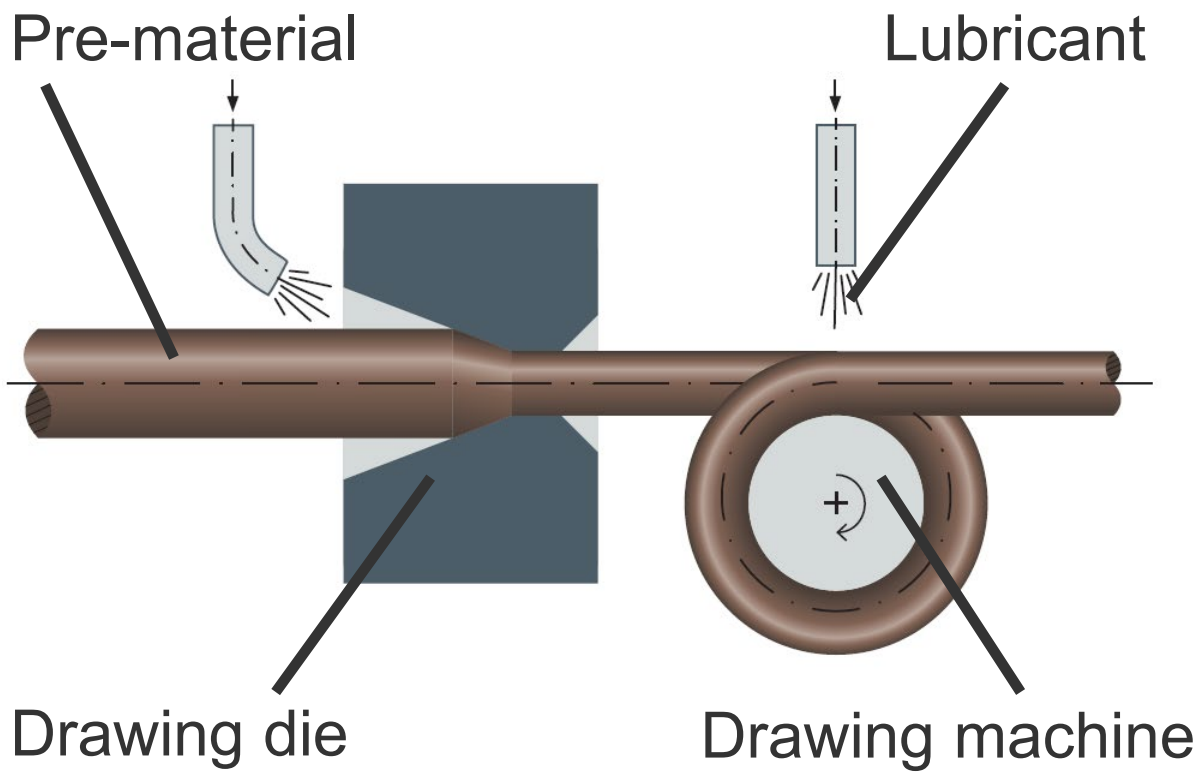
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The Drawing Process – A simple system with four elements?

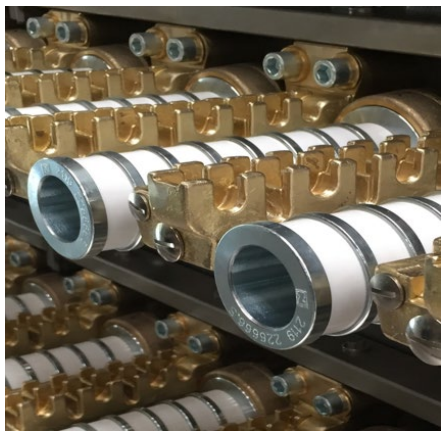
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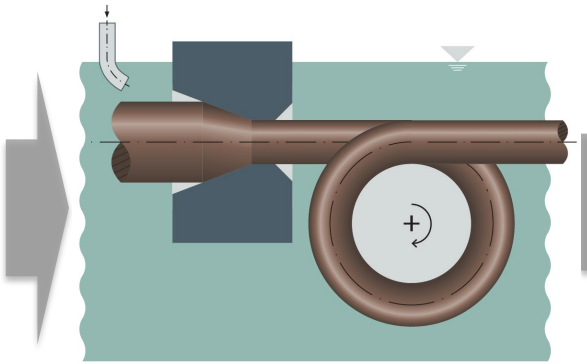
Chaining of drawing processes and influences

e.g. 2-3 drawing machines with 11-25 drawing steps

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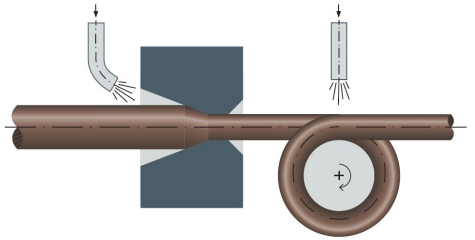
Pre-Processes:

- Melting
- Rolling
- Transport
- Storage
- Wire drawing
- Anealing



Chained Processes / In-between-Processes:

- Wire drawing
- Anealing
- Transport
- Storage
- (Coating)

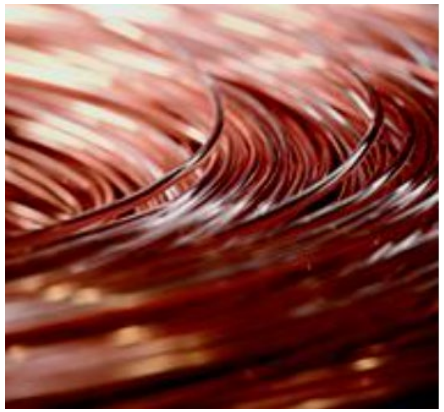


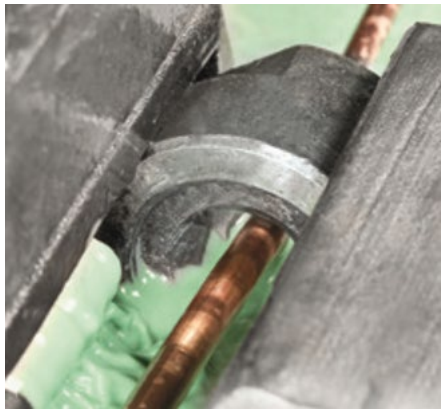
Post-Processes:

- Wire drawing
- Anealing
- Transport
- Storage
- Winding
- Rolling





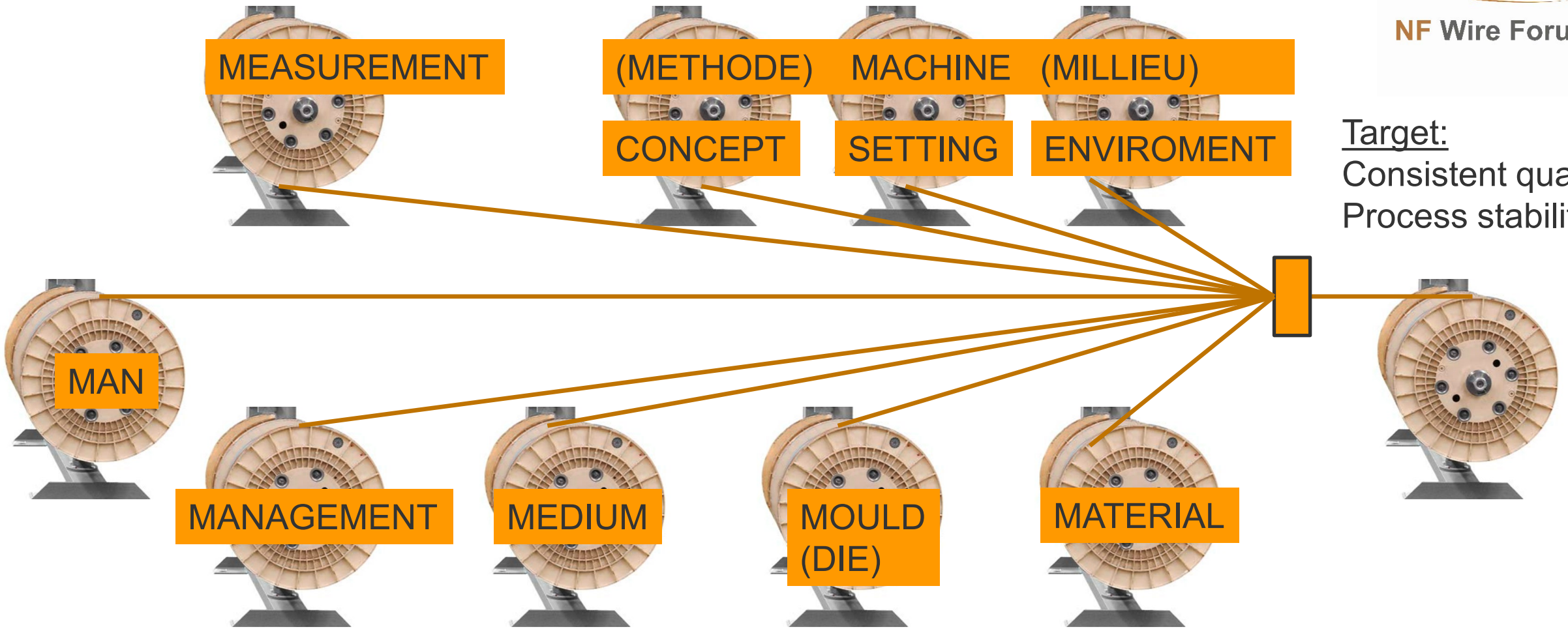






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7 M (influencing factors) of the drawing process



Target:
Consistent quality
Process stability

The Factor „Man & Management“

start-up / handling / care / choice … of resources

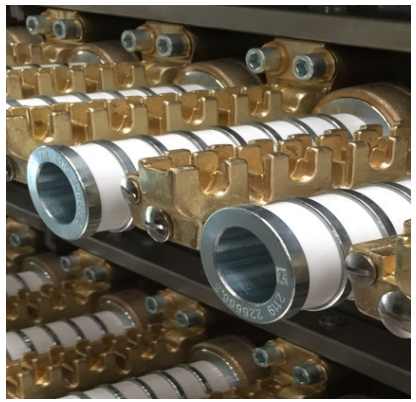
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4 basic-system-elements









machine	- choice - maintenance - conception - start-up - set-up - enviroment
drawing die	- choice - maintenance
die set	- conception
lubricant	- choice - care - conception
pre-material	- choice - care (transport + storage) - conception - selection



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The factors influencing copper fine wire production - a summary

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- according to our definition, fine wire starts at **a diameter less than 0.15mm**
- fine drawability describes **the ability of a reliable production** of this cross-sections

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The factors influencing copper fine wire production - a summary

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- the performance indicator of fine drawing ability is the **production output till wire break - KPI**

- influencing variables of the fine drawing process are **the 4 system elements** that will be described during the following, **their interaction and the person acting on them**

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Join in:
Live Panel on May 11th at 14h CET

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Please send **your questions** until May 10th to nf-wire-forum@aurubis.com

We look forward to seeing you again virtually!

www.nf-wireforum.com



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