DEEP TECH 2M

# BOOK OF ABSTRACTS

## DEEP TECH OPEN SCIENCE DAY 2024

1ST DEEP TECH OPEN SCIENCE DAY CONFERENCE
APRIL 5, 2024, KRAGUJEVAC, SERBIA

European Institute of Innovation & Technology

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Nenad Grujović, Boban Stojanović

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ПРИРОДНО-МАТЕМАТИЧКИ ФАКУЛТЕТ 1972 КРАГУЈЕВАЦ

# Evaluation of Deformation Strengthening in Modern Sheet Metals

**Srbislav Aleksandrović*, Đorđe Ivković, Marko Delić**
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**Abstract**

Deformation strengthening i.e. strain hardening is very significant phenomenon in almost all metal materials especially in contemporary sheet metal materials. It consists in the increase of stress properties of strength, and appears as a consequence of realized plastic deformation. This extensive research includes 8 sheet metals of different materials. There are 4 steel sheets: low carbon steel DC04 (thickness 0.8 mm), austenitic stainless steel X5CrNi18-10 (2,0 mm), austenitic stainless steel X5CrNiMo17-12-2 (2,0 mm) and spring steel 51CrV4 (0.6 mm). Also there are sheets of following materials: brass CuZn37 (thickness 0.8 mm), Al alloy AlMg3 (1.5 mm), Al alloy AlCu4Mg1Mn (1.0 mm) and pure copper Cu-DHP (0.8 mm). The deformation strengthening was investigated through the strengthening curves and the exponent of the deformation strengthening i.e. strain hardening exponent.

Knowledge of formability is very important in the technological processes of modern sheet metal processing. Within that, the phenomenon of deformation strengthening has a special place. Knowledge of strengthening curves and strengthening parameters has a direct application in the formation of sheet metal processing technology, for example in the automotive industry and the vehicle industry in general.



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## Graphical abstract

EVALUATION OF DEFORMATION STRENGTHENING IN MODERN SHEET METALS

Srbislav Aleksandrovic, Djordje Ivkovic, Marko Delic

**Table 1.** Overview of total results

| **Strengthening factor - Results in total** | | | |
|---|---|---|---|
| 1) Steel DC04 | | | |
| First method | 0,173 | | |
| Second method | 0,236 | | |
| Third method | / | / | / |
| 2) Steel X5CrNi18-10 | | | |
| First method | 0,359 | | |
| Second method | 0,377 | | |
| Third method | 0,392 | 0,387 | 0,488 |
| 3) Steel X5CrNiMo1712-2 | | | |
| First method | 0,480 | | |
| Second method | 0,463 | | |
| Third method | 0.219 | 0.376 | 0.400 |
| 4) Steel 51CrV4 | | | |
| First method | 0,261 | | |
| Second method | 0,257 | | |
| Third method | 0.183 | 0.196 | 0.195 |
| 5) Alloy AlMg3 (ENAW 5754) | | | |
| First method | 0,223 | | |
| Second method | 0,221 | | |
| Third method | 0.142 | 0.135 | 0.163 |
| 6) Alloy AlCu4Mg1Mn (ENAW 2024 T3 air) | | | |
| First method | 0,204 | | |
| Second method | 0,196 | | |
| Third method | 0.136 | 0.152 | / |
| 7) Copper Cu-DHP (DVP 1 Cu. 38) | | | |
| First method | 0,190 | | |
| Second method | 0,186 | | |
| Third method | 0.093 | 0.149 | 0.159 |
| 8) Brass CuZn37 | | | |
| First method | 0,521 | | |
| Second method | 0,455 | | |
| Third method | 0.452 | 0.535 | 0.558 |



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