



## ESAFORM Webinar Series 2022

### Advanced Material Testing Methods for Sheet Metals — Review of linear and nonlinear stress path experiments —

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**Date/time:** 7th December 2022 / 15:00 CET

Registration link, in advance for this meeting:

[https://videoconf-colibri.zoom.us/meeting/register/tJ0pdOGhpi4tHdSHGdwasya65O\\_BoVkgk4gZ](https://videoconf-colibri.zoom.us/meeting/register/tJ0pdOGhpi4tHdSHGdwasya65O_BoVkgk4gZ)

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#### Abstract

Advanced material testing methods for sheet metals are reviewed in this lecture. Material models used for forming simulations are usually determined from linear stress path (LSP) tests. However, in sheet stamping, the material generally undergoes nonlinear stress paths (NLSPs). Therefore, it is important, in discussing the effect of material models on the accuracy of forming simulations, to ask how accurately material models determined from LSP tests can reproduce the material behavior under NLSPs. In this presentation, I briefly introduce LSP testing methods using a cruciform specimen (ISO16842: 2021) and a tubular specimen subjected to internal pressure and axial forces. Next, I review the NLSP testing methods as shown below to compare the measured results with those predicted using the material models determined from LSP tests:

- ◆ Nonlinear stress path experiments with intermediate elastic unloading
- ◆ Nonlinear stress path experiments without intermediate elastic unloading
- ◆ Material test method using zig-zag stress path.

#### Biography

Professor Kuwabara received a degree of Doctor of Engineering from Tokyo Institute of Technology, Japan, in 1987. He is currently a distinguished professor at Division of Advanced Mechanical Systems Engineering, Institute of Engineering, TUAT. His research focuses on the development of advanced material testing methods for metal sheets and tubes, as well as for polymer tubes, for enhancing the accuracy of material models to be used in forming simulations. He is also an Adjunct Professor at the Graduate Institute of Ferrous and Energy Materials Technology, Pohang University of Science and Technology, since 2010. In addition, he served as a member of the Board of Directors of ESAFORM (2014-2021), the Japan Society of Technology of Plasticity, and the Iron and Steel Institute of Japan. He was the chairman of the 11th International Conference and Workshop on Numerical Simulation of 3D Sheet Metal Forming Processes (NUMISHEET 2018), which was held in Tokyo in 2018. The biaxial tensile testing method using a cruciform test piece developed by his research team in 1998 has been standardized as ISO 16842: 2021 and JIS Z 2257: 2021.

