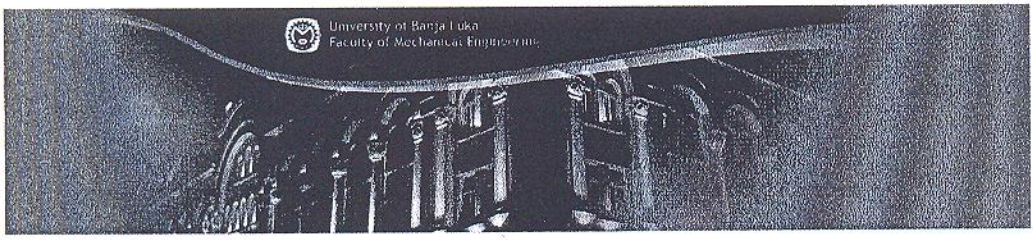


# FORMING LIMIT INDICATORS IN METAL FORMING

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***Summary:*** *Precise information on forming limit indicators is very important in designing the technological processes of metal forming. The significance of stress state and strain history for limit strains realization is emphasized above all. For the case of upsetting, indicators in the system of principle surface strains are specified, as well as classic example of FLD, as a dependence of limit strain on stress ratio coefficient. For the case of sheet metal forming – deep drawing, the example of determining FLD at classic and two-phase - proportional forming – is shown. The specified experimental results are related to the area of stretching and the area of pure deep drawing of axis-symmetrical pieces.*

***Key words:*** *Metal forming, Forming limit, Strain path, Upsetting, Deep drawing*

## 1. INTRODUCTION

When designing the technological processes of metal forming, it is extremely important to understand the concept of limit formability, which can be defined as the ability of materials to achieve permanent shape changes, i.e. ability of materials to accomplish maximal strains in the given forming conditions. The criterion for defining limit formability can be either fracture or forming instability (appearance of localizations). The influence of certain factors on the value of limit strain, as a numerical indicator of materials formability, can be implicitly expressed, by formability function [1]:

$$D_M = \varphi_e^l = f(H_M, S_M, T_o, \dot{\varphi}, T_\sigma) \qquad (1)$$

where:

$D_M$ – material formability,

$\varphi_e^l$ – limit strain,

$H_M$ – type of material, defined by a particular chemical content,

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