Non-thermal Laser Stretch-Forming

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Abstract. A new process technology for stretch-forming of thin sheet metals is presented within this paper. This new technology is based on shock waves as a source for the forming energy, which are created through laser pulses. The results of some preliminary experiments show, that stretch-forming with laser pulses is possible. The influence of parameters like defocussing, power density, pulse energy, number of pulses and material are worked out with excimer-laser pulses. The results show, that uniform shaped domes with a dome height over 250 µm with diameters of 1.4 mm could be produced. More recent studies show that even better results can be reached through the use of TEA-CO_2-Lasers, since no confinement is needed and ablation at the surface is avoided. The absence of ablation at the surface makes this new technology even more interesting, since not only the surface remains accurate, but also since several pulses can be applied at one point and thus higher forming degrees can be reached without increasing the power density.