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Scaling laws for the additive manufacturing

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Abstract. The evaluation of simple thermal model of selective laser melting (SLM) process shows that the temperature distribution in the sample is characterized by two dimensionless parameters: normalized enthalpy and the ratio of dwell time to the thermal diffusion time. We demonstrated that the melt depth data taken for different machines for different materials collapsed in one curve, making possible to rescale the optimal processing parameters between the different materials and machines. The melt pool depth, width and the length are the universal function of these two parameters. Within the operational range of parameters for SLM these functions