

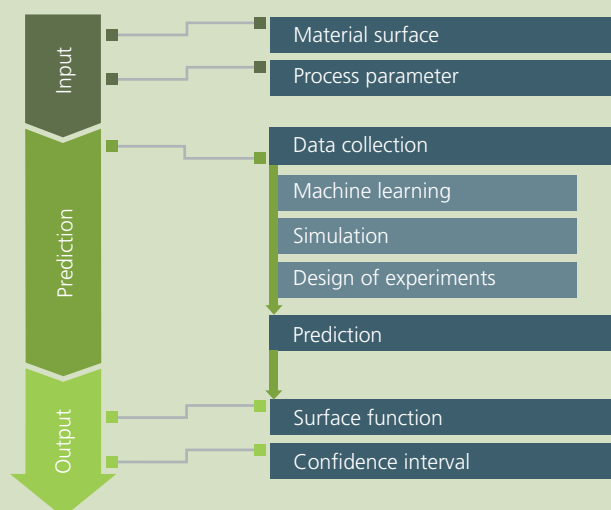
OPTIMIZED SURFACES THANKS TO MACHINE LEARNING

Nature provides a perfect model for technical surfaces: in addition to the lotus leaf for repelling water and sharkskin for reducing flow resistance, there are many examples of optimized surfaces. Fraunhofer IWS offers models based on artificial intelligence and predicting intentional surface functionalities.

At present, it is possible to intentionally influence surface properties using laser patterning so that surfaces are cleaned more easily. Thanks to hydrophobic effects, implants are better tolerated by the human body, and engines operate more efficiently. Researchers are using more and more statistical and machine learning methods to identify suitable surface structures. As a result, functions can be predicted before the patterning process itself. The IWS synergetic approach including scientific know-how, simulation and experimental data modeling allows

to predict specific surface functions. The Fraunhofer IWS team uses various machine learning algorithms as well as further deep learning paradigms, particularly for unexplored materials, to identify correlations between structure and surface function. This approach facilitates ever faster rough predictions of the final surface function, so that the work required for surface structure development is significantly reduced. The IWS' task as a central consortium partner in the Horizon 2020 "SHARK" project is focused on creating prediction models for future production processes. In this way, the Dresden researchers contribute to making surface function an easily selectable parameter.

Prediction of water-repellent surfaces



It is possible to determine laser-patterned surfaces' properties by means of prediction modeling. The models, in turn, use more and more empirical and numerical methods based on machine learning. As a result, users can for example implement self-cleaning surfaces more efficiently. Having entered the parameters required, the scientists draw on machine learning, simulation models and knowledge gained from experiments for prediction.



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