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Digital die casting
The transparent die casting process — traceability and prediction through digitalization and AI

Figure 1

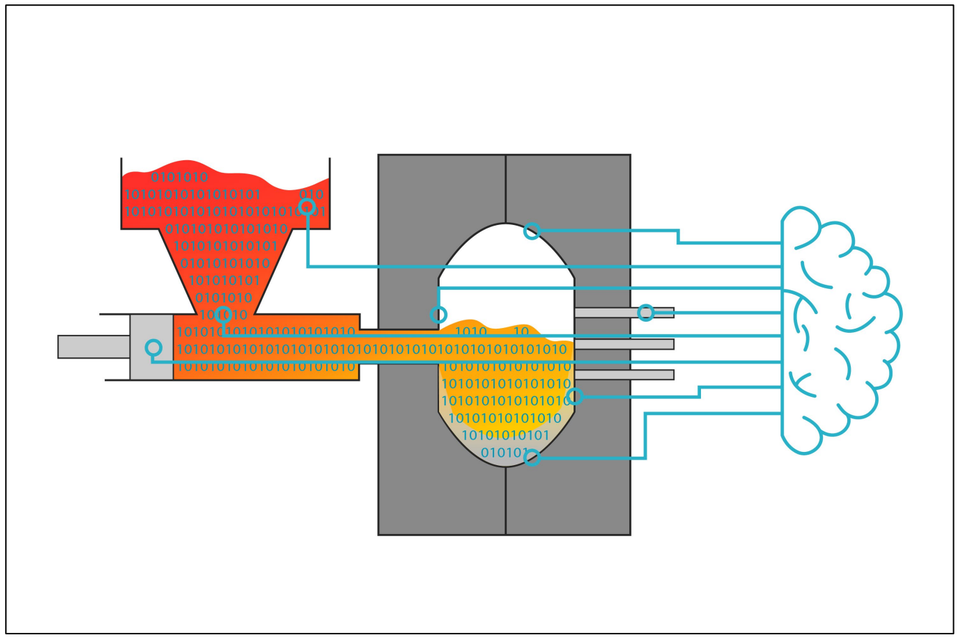

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Figure 2

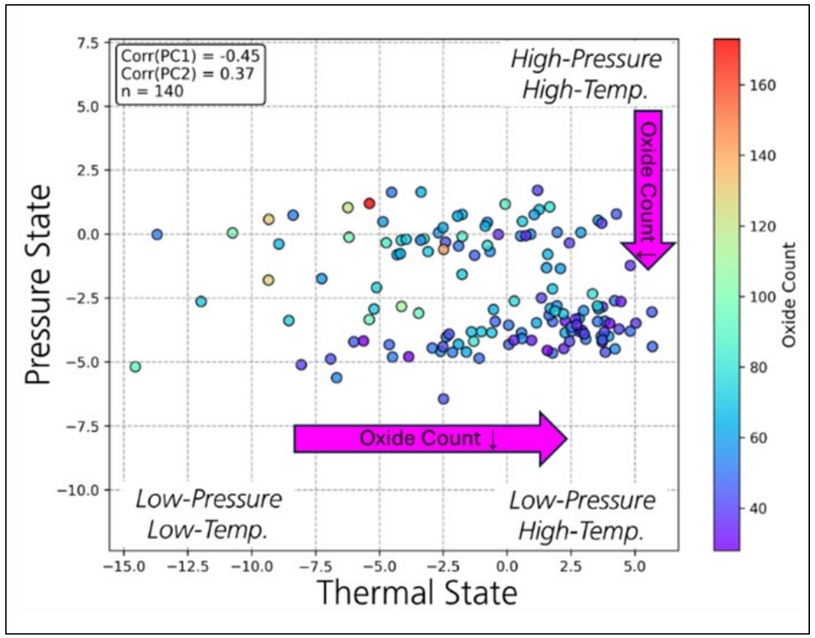

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Fig. 1: The transparent die casting process — meeting the economic, technological, and ecological requirements for cast parts with an integrated knowledge base of material and process data.

Fig. 2: Analysis from the knowledge graph of the transparent die casting process: The relationship between the process parameters and the oxide content of cast samples was examined. All samples were cast using identical process parameters, but due to the nature of the process, there is a variance in the actual values of the pressures and temperatures measured by sensors in the die casting mold. The various casting parameters were reduced to general pressure and temperature profiles using machine learning. These two new parameters describe approximately 50% of the variance. The graph shows the relationship between the new parameters (x- and y-axis) and the measured oxide number (different colors) of the cast samples. Each measurement point represents a cast sample.
It can be seen that samples in the low-pressure and high-temperature range (bottom right) tend to have fewer oxides. This provides a starting point for process optimization and prediction of casting quality.