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Design & Processing Properties (DPP) Material Properties for Design and Processing Based on Neuronal Network

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Even if a finished plastic part looks rather simple we all know that it incorporates a lot of experience and know how during the development. The reason is that engineers have to take numerous complex relationships into consideration when designing a plastic part. Beside the raw material the production process itself has a huge influence on the plastic part performance.

The conventional design process relies on datasheets derived from standard tests and test specimen. Since the properties of a part can change, depending on the temperature, filling pressure or melt flow, the prediction of the real part performance was difficult.

That is why Bayer MaterialScience developed the computer software Design & Processing Properties (DPP). It is based on an hybrid neuronal network which imitates the way information is processed in the human brain. In a "learning" or "teaching" phase information of many injection molding trials and different material compounds are offered as an input with well known output results. The neuronal network "learns" from measured data the connectivity between input and output targets.

All the design engineer now has to do is enter the requirements that the plastic part has to meet and the computer promptly determines the right material and processing conditions. DPP is structured in a modular manner.

Within the "Design" and "Mechanical" module the engineer extracts information like admissible loads for different load types or stress-strain behavior at every temperature as a function of the process.

The "Processing" module offers information regarding the feasibility of the injection molding process with determination of filling pressure, shrinkage or static friction in the mold. Product based attributes like viscosity could be extracted from the "Rheological" module.

With DPP processing parameter can be modified on the computer at any time and change in terms of material properties become visible. The program was developed to save time and money and should reduce prototypes and injection molding trials.