Extrusion process simulation : A tool to save time and money

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This paper describes different studies linked to extrusion problems encountered during production in different field of extrusion industry (cable, tube, sheet, Wood Plastic composite….). Extrusion simulation and/or rheology analysis can be used to understand the origin of the problems and to set up durable industrial solutions by selecting the appropriate compounds, optimizing screw profiles, modifying the geometries of the tooling or by adapting the process conditions.
In addition, numerical simulation of extrusion appears to be a good tool for diagnostics, expertises and find a solutions. There are today many benefits to use extrusion simulation to achieve: (i) quick determination of causes and defects to reduce production downtime, (ii) optimization of designs before expensive prototyping and testing, (iii) exploration of new ways to improve operating conditions, product quality and production rate.
In collaboration with Material Services and Processing consulting company: http://msp-groupe.com/, and by using COMPUPLAST® Virtual Extrusion Laboratory™ software, we present in this paper some examples of process troubleshooting based on extrusion simulation investigation.
Troubleshooting is an important challenge in extrusion operations. Good troubleshooting needs to be efficient and rapid to avoid time consumption and costs. But before solving problems in extrusion operations, basic understanding of the origins of the problems is an important step on the way of troubleshooting.
For example, by using halogen free fire retardant compound (HFFR), some of Polyone's customers faced issues to produce a new range of energy cables. Production scrap level was around 30% to 35 % due to several defaults (die drool issue) detected at the cable surface.
By using simulation, an original die was designed to support our customers and to solve the problem.The study consist of simulating the process and the flow inside the tooling chamber. New die design and adapted process conditions were applied leading to solving the die drool defect issue.

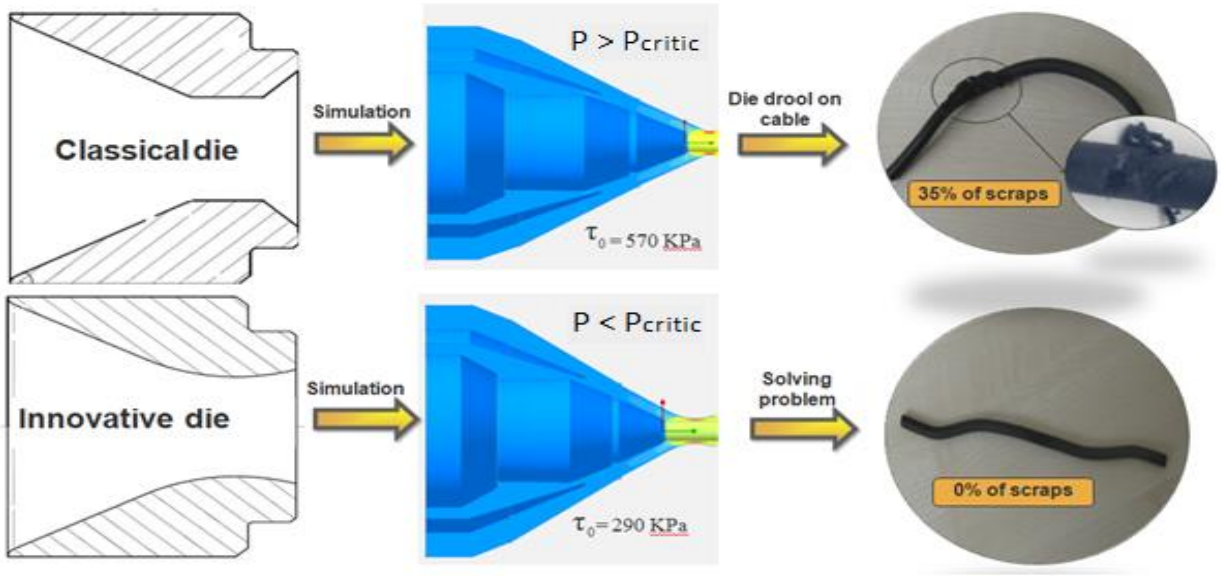

Figure 1. Optimization of process conditions and die design based on simulation of the flow inside the tooling chamber