

X-Plorator - High throughput technology for rapid compound development

Dr. Hans Korte, Wismar

We know that development of new compounds is troublesome and needs experts with a lot of experience to achieve good results in reasonable time for manageable costs. In WPC/NFPC we have to combine fillers, matrix plastics, colorants, coupling agents, antioxidants, lubricants etc., to compound the ingredients in varying concentrations and processing conditions to achieve required technical properties. A lot of expertise is needed to choose the right material within a given category, e.g. wood particles of defined wood species, size and moisture or a polymer with special properties making it useful for injection moulding or extrusion and so forth. Typically this expertise cannot be found as a published collection of proved recipes. Selling this expertise in form of customized products is the business model of compounding companies.

If you want to start a WPC/NFPC production you need this expertise but you only can buy products that may fit your requests or not. If you want to change properties of your product you have to order a new compound. If you start your compounding by your own, you cannot foresee all interactions happening when changing one or more recipe parameter.

X-Plorator is a technology to overcome this problem. X-Plorator is a tool including design of experiment, compounding and production of test specimen in one step, testing and evaluating test results. In contrast to classical compound development with linear optimisation of each parameter, X-Plorator uses statistical design of experiment. With several factors to be considered, easily a high amount of experiments have to be performed. Normally this is time consuming, if all compounds have to be mixed in single processes. X-Plorator uses modern dosing technology to vary recipes directly at an injection moulding machine when moulding test specimen. Channels and tools are rinsed with several "lost shots" of a new recipe, resulting in high speed production. Analysing test specimen parallel to production allows throughput of up to 150 specimen within 3 weeks!

Test results, recipe concentration and additional factors, e.g. prices are analysed statistically. At the end there is not only one optimized recipe for requested properties but a statistical model enabling search for new combinations not thought for in the beginning. Besides technical questions, mostly of high interest is to find out which recipe is the cheapest one to perform asked-for properties.