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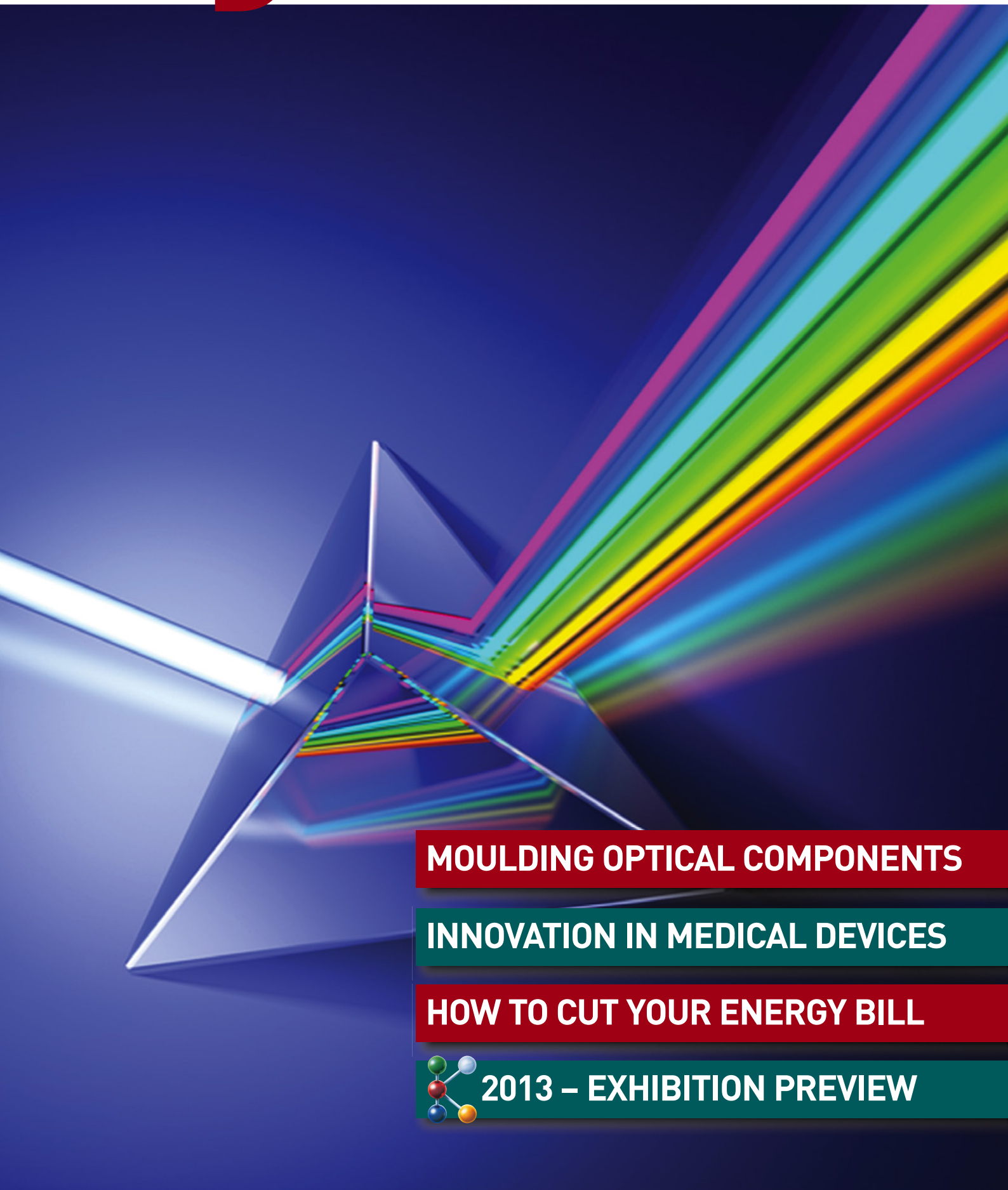

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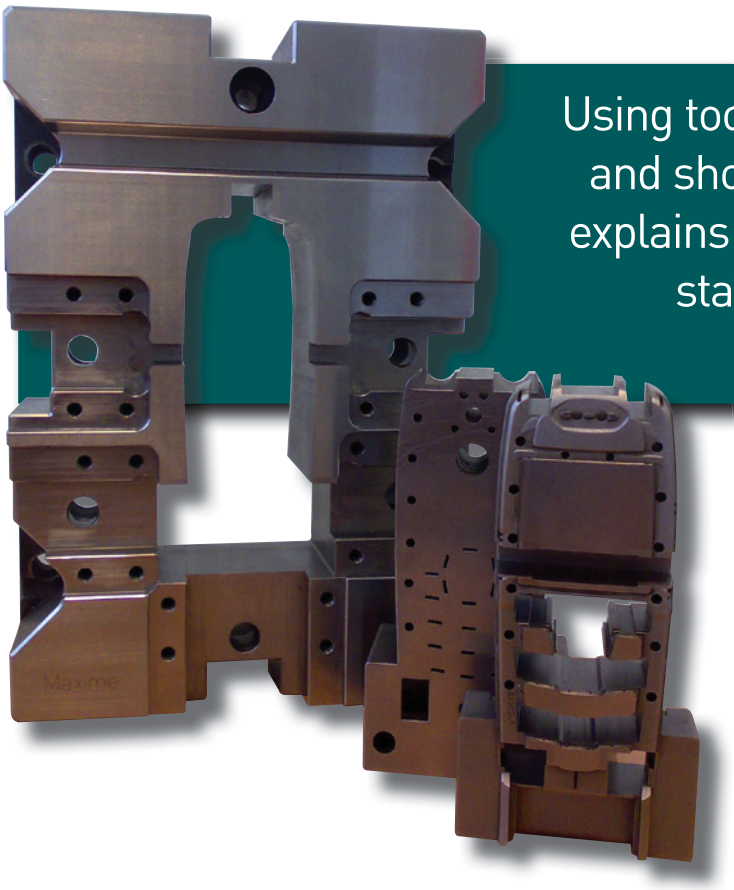

Using tool standards can help control cost and shorten lead times. **Andre Eichhorn** explains how and discusses integration of standardised tooling within the DFM product development process

Reaping the benefit of tool standards

There are some real benefits for moulders and buyers of plastics components in terms of cost, lead time and part quality in developing a standardised mould tool strategy. But, as with every step in the product development chain, gaining the maximum benefit means considering implications and restrictions early in the design process.

Several methods can be used to establish a tool standard that will benefit your business. In general, these standards – Tool Requirement Specifications (TRS) – focus on OEM and/or contract manufacturer requirements and can be considered as guide lines in a documented form.

A general TRS document will typically define the interfaces to be used between the injection moulding machine and the mould tool such as the water and hotrunner connectors, clamping system fixings and the connection to the centre ejector. It may also specify some general Critical to Function (CTF) mould components such as mould locks, hotrunner equipment, wear plates, cycle counters and the like.

The next level would be to develop a fully defined tool standard. This "standard tool system" can include several tool sizes and tool functions that can be used to produce a specific range of injection moulded parts. AST Technology has developed a global standard of this type for a manufacturer of mobile phones.

There are several reasons for having a tool standard system. Firstly, by working with a range of off-the-shelf mould components, your own tool production shop can focus solely on the critical cavity/core area. The complete mould base can be received from a certified supplier fully machined and ready for assembly. Today this service can be provided by many hotrunner suppliers, who can deliver the complete hot-half of an injection mould tool.

Figure 1 shows an exploded view of a standard system developed and maintained by AST Technology for an OEM client. The mould tool shown consists almost exclusively of parts supplied finished machined by sub suppliers. In this example, even the cavity core area was ordered as pre-machined blank parts which just needed to be customised to the moulded component geometry. Figure 2 shows two different mobile phone covers intended to be moulded using the same system and same off-the-shelf blank parts for core insert and surrounding sliders. By using this system it was possible to build a complete 4-cavity mass production tool in less than 4 weeks.

Because standard mould components can be sitting on the shelf waiting to be pulled for the next project, lead times can be reduced and cost visibility for each individual project improved. However, there are also some constraints. Prime among these is that a tool standard may not be applicable for every injection moulding part or project.

Prior to the development of a fully specified tool standard, careful consideration needs to be paid to the components to be moulded. All components need to be categorized, and every category assigned to a specific

Main image: A standard tool design developed by AST for an international mobile phone firm to simplify its production and shorten lead times.

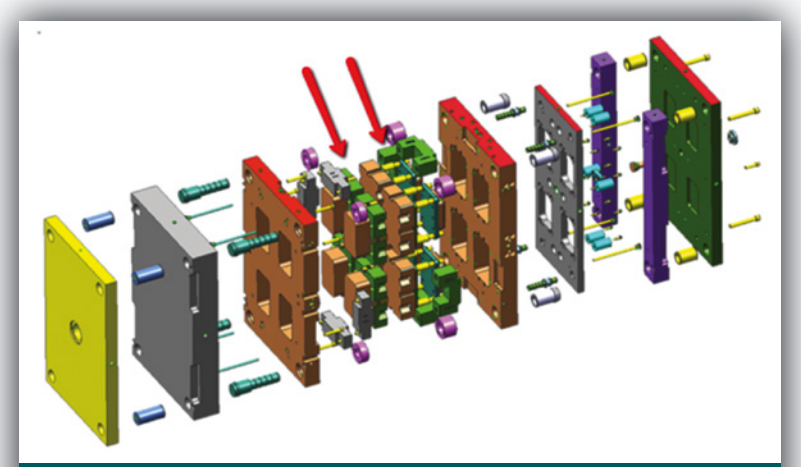

Figure 1: Exploded view of a tool standard used by a European mobile phone OEM. Only the marked areas are customised at the tool maker
Source: AST

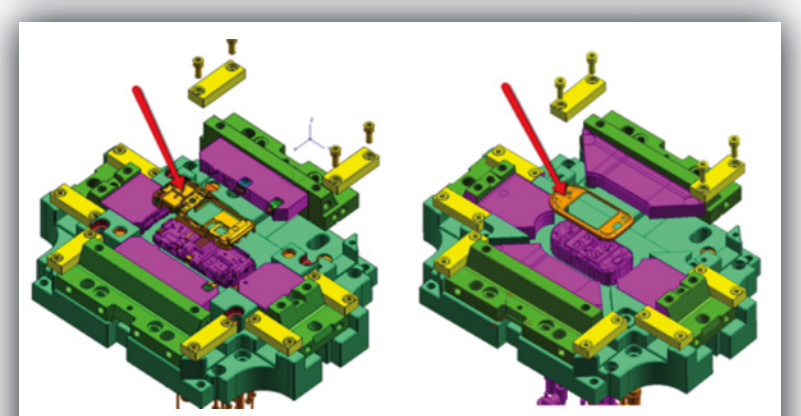

Figure 2: Cavities for two different phone covers sharing the same tool type. Only the magenta areas are part specific
Source: AST

tool type within the new tool standard. A fully specified tool standard, for instance, will not make sense where the range of components to be moulded covers a huge variety of sizes or demoulding features (the tool features needed to demould undercuts on a plastic component design). It is also important to be sure that the categories selected within the tool standard are suitable for both current and likely future part requirements.

During the DFM phase of a product development project, the engineering team needs to review whether the specific tool type selected is appropriate for the specific injection moulded component. The DFM engineer will know the tool standard and must be sure it can accommodate the size of the part and can handle the gating, cooling, functions and demoulding required. During the early stage of a product development it is possible to play with the component design in such a way that it suits a specific tool design, which is very often less costly than changing the tool to fit the component design.

However, where you have different categories of components that can be assigned with confidence to a specific tool type from your tool standard, it is possible to go ahead with confidence during the DFM phase to order the required standard mould parts from sub suppliers. When doing this, of course, it is important to recognize that some important characteristics of the injection moulded component will then be fixed, such as the number, position and type of gate points and undercuts. This is essential to ensure that the complete tool system will function with the already ordered standard tool components.

Using a tool system such as this can also provide evidence for reusability of specific mould components when an injection moulded component reaches the end of its life cycle, such as hotrunners or complete mouldbase.

Also, these system tools can be used as prototype moulds to test new component designs by simply producing new cavity and core sets and reusing the mouldbase from previous projects. This can be very cost effective and can also help reduce the lead time for prototype mould tools.

Reusable mould bases are generally known as mould frames. Some manufacturers do not remove these mould frames from the injection moulding machine when they have a product change during production - they just change the cavity and core stacks. This can not only reduce the downtime of a moulding machine during a product changeover but can also reduce the cost of capital equipment.

Owning a tool standard can also have a beneficial impact on product quality where production of the parts has been outsourced. Where, for instance, a manufacturer is going to produce a specific product in Europe, Asia and in the US and plans to have the mould tools produced local to the manufacturing sites, the use of a single tool standard and design guide can reduce scope for quality variation. There is also a benefit in the event that a tool is moved from one region to another as all the machine interfaces are to a defined standard.

About the author:

André Eichhorn is general manager of Germany-based AST Technology. This is the latest instalment in a series of articles in which he discusses how part and moulding problems can be overcome at the start of any project by the application of Design for Manufacturing techniques. You can read the most recent articles in this series **here**, **here** and **here**.

You can also visit AST Technology at the K-Fair in October. Find the company in Hall 1, Stand E36.

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