IMERYS: a multi-dimensional solution

AC talks to Philippe Barré - Business Innovation Development Manager at IMERYS - about the company’s growing involvement with the growth of 3D printing...

When did Imerys Ceramics start being involved with 3D Printing/Additive Manufacturing?
3D Printing (3DP) technologies for sanitaryware and tableware segments, called traditional or whiteware ceramics, are still at their infancy in 2018.

However the first academic studies are dated in 2007 and are based on technology using plaster powder, which is not considered true ceramic or porcelain materials. Printers for whiteware ceramics, based on extrusion or PDM (Paste Deposition Modeling technology) were available on the market only 4 years ago, and of 2014.

This has to be put in perspective with other materials such as plastic and metal for which it started respectively in the early 80’s and mid 90’s.

Before the first PDM printers were available for whiteware ceramics, Imerys Ceramics was already scouting technology but with no active innovation program as there were no solution readily available and merely no market pull, except for some home-made plastic printers revamped to be used for plastic clays.

With the first PDM printers, Imerys Ceramics started experimenting this technology and rapidly came to the conclusion that several aspects needed to be optimised to make users’ lives easier, the most important being the ceramic feedstock.

With more than two centuries of expertise in ceramic feedstocks formulation and production, it was natural for Imerys Ceramics to initiate in 2016 an innovative program on 3DP delivering its first success last year with EZ Print3D™.

Can you share the main evolution regarding 3DP for sanitaryware & tableware ceramics over the last years?
We first need to distinguish 3 main components of 3DP: the printer, the software and the ceramic feedstock.

Dating the origin of whiteware ceramic 3DP at the end of 2014, the major evolution in PDM with regards to printers has been bigger building chambers and more sophisticated printing heads, offering an incremental step of optimisation for ceramic pastes.

Of course, the number of printer manufacturers has increased even though they are still very few on the market place.

It is worth noticing that there are some studies based on binder jetting technology but very few printers are available on the market as they have been designed first to serve the sand casting molds and are therefore not yet optimised for whiteware ceramic powders’ requirements.

On the software side, there has been some evolution but none of the softwares are designed for ceramic materials. Users are still very limited in the options available to optimise their ceramic printed results.

On the side of ceramic feedstock, a significant evolution was the introduction of the above mentioned solution EZ Print3D™, end of 2017.

Would you say that current 3DP technology performance matches customer expectations?
3DP for whiteware ceramics is nowadays more of a push solution technology. Whiteware ceramics 3DP is experimented and used by the few Early Adopters and is raising a lot of interest and curiosity from all the other ceramic manufacturers. At this point, PDM is the only technology that offers the best compromise to experience whiteware 3DP.

So in that context, where do you see a value for customers in 3DP? And why should ceramic manufacturers be convinced that it is time to invest now?
The primary value is certainly to get acquainted with this technology that requires specific know-how. Its acquisition is a long process and it needs to be prepared early on to fully benefit from the technology.

For some designers and academics it is also a way to start producing unique shape parts, on-demand, tailored in size or “size one batch”. It’s important to keep in mind that the shape freedom, one of the key strengths of 3DP, is not yet at the rendez-vous.

Can you tell us more about EZ Print3D™, how it works and the services offered along with this solution?
Ensuring a stable and consistent ceramic feedstock that imparts the right rheology to be processed in PDM printers is far from being a simple exercise. Imerys Ceramics has put all its expertise to offer a performing solution by initiating early on partnerships with key stakeholders in the value chain. The success of 3DP technology for ceramic whiteware can only come from the best combination of feedstock, printer, software
and users’ understanding of 3DP specificities. Hence EZ Print3D™ was brought to the market with a key objective: make 3DP easier to our customers and facilitate market adoption.

EZ Print3D™ is dedicated to the sole 3DP technology currently on the market for ceramic whitewares, namely PDM (other named FDM for plastics). Our feedstock solution is the world’s first ceramic paste that customers can directly feed into their printers without any special or hand-made preparation.

Our solution is available in two different options: "Ready-to-Fill" for users who want to enjoy the benefits of a ceramic paste designed for 3DP, and "Plug & Play".

The "Plug & Play" solution consists in a ceramic paste delivered into a unique cartridge produced in our plants and a pneumatic cartridge holder designed by Imerys Ceramics (Pic 1), replacing the basic reservoir with manual refill. This combination is the result of Imerys Ceramics’ research and is patented.

The cartridge ensures that the ceramic paste is free from air bubbles, which causes defects in quality printing or in the green mechanical strength causing collapsing of the structure. The replacement of an empty cartridge to a fresh one takes less than 2 minutes and reduces massively the material loss, keeping the workstation clean and safe.

Along with EZ Print3D™, Imerys Ceramics also offers technical support and a dedicated 3DP competent team to assist our customers. For those who want to practice 3DP before investing in a printer, we also offer tailored services to test design and printing rendering through local partners or at Imerys Ceramics lab.