



## The Wave



**D**uring the COVID-19 pandemic we've heard a lot about waves. First waves passing, second waves arriving, and how many such waves we might still have to endure in the future. Despite all the talk, each wave seems to catch us largely by surprise and we are too frequently left in a shell-shocked state, wondering 'How on earth could things get so bad so fast?' The problem here is that epidemics are an exponential growth phenomenon, and human beings are notoriously bad at grasping the import of exponential behaviour. Our internal forecasting and world-modelling instincts like to assume that things change linearly, and as a result we find it difficult to prepare ourselves for the true impact of an exponential event even as our rational minds can see it looming.

Exponential growth is linked to another part of the modern human experience, namely the computing power of our digital machines. This means that their ability to solve any particular problem passes from laughably impossible to difficult, then to trivially easy in a remarkably short space of time, upsetting and revolutionizing everything in its wake – much like a wave.

The point at which that wave breaks over your industry is determined only by how difficult it is to compute solutions to the mathematics describing it. In process metallurgy we might be forgiven for thinking that our engineering challenges are so vastly complex that traditional workflows will never be replaced by computational alternatives, but it's only a matter of time. Right now the digitalization tsunami is tiny and easily ignored, but the ripples are building momentum, and recent experiences should warn us that it's time to prepare, prepare, prepare.

**Q.G. Reynolds**

*Pyrometallurgy Division, Mintek  
Process Engineering Department, Stellenbosch University*