Industry 4.0 – Advanced Flotation Froth Optimization

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The pressure is on for mine operators to increase recovery despite falling ore qualities. Traditionally vision (i.e., camera) systems have proven essential when controlling froth velocity for optimum flotation control. However, there are numerous conditions when measuring froth velocity is not enough, for this, additional innovation is required. And here is where APC enters the game. APC transforms a traditional vision system to a “smart” system capable of optimising recoveries and overall performance continuously.

Traditionally froth analysis has focused on measuring froth velocity and stability. These measurements remain important. However, they don’t always provide enough information to enable enhanced recovery. That’s why FLS’ APC technology offers a third and cutting-edge feature: the ability to analyse froth in its entirety as well as classifying froth by types and conditions, which are then fully integrated within the FLS APC regulatory framework. The APC integration is key, as it automates the regulation and optimisation of the complete flotation system in response to both upstream and downstream constraints or requirements.

How? By adding machine learning technologies within the froth cameras, DNN algorithms are added. When training the DNN camera it is possible to identify numerous properties like cell lip or froth pulping detection, as well as, providing high resolution bubble colour and shape analysis. Additionally, the new design offers multi-regional analysis to capture a better representation of the complete flotation cell’s performance. Finally, an added feature is the improved lighting algorithms making the optical digital analysis more accurate and robust.

FLS has also introduced a new hardware and infrastructure design, with each camera having a dedicated computing processor which offers better data bandwidths when transmitting analysis back to the control room. The solution offers a user-friendly browser-based interface, requiring no additional software installations.

This paper provides the before and after results from recent FrothVision mine implementation. The case-study also illustrates the additionally capabilities of the RecoveryExpert, which is FLS’ dedicated APC system for flotation processes. RecoveryExpert uses these additional features of the DNN camera to provide state-of the-art propriety control and optimisation algorithms. In short, the RecoveryExpert is brain behind the DNN cameras. The paper concludes with a quick preview of the up-and-coming fourth generation digital technologies linking flotation optimisation with prediction maintenance and early warning performance monitoring, FLS’ PerformanceIQ.