

Making your thickener's feedwell an effective flocculation vessel – lessons from the AMIRA P266 projects

PD Fawell¹, CB Solnordal², TV Nguyen³, AF Grabsch⁴, DW Stephens⁵

1. Research Scientist, CSIRO Mineral Resources, Waterford WA, phillip.fawell@csiro.au
2. Research Scientist, CSIRO Mineral Resources, Clayton VIC, chris.solnordal@csiro.au
3. Research Scientist (retired), CSIRO Mineral Resources, Clayton VIC
4. Project Scientist, CSIRO Mineral Resources, Waterford WA, alton.grabsch@csiro.au
5. Director, Applied CCM, Ferntree Gully VIC, d.stephens@appliedccm.com.au

ABSTRACT

For over 25 years, the AMIRA P266 “Improving Thickener Technology” series of projects sought to advance fundamental understanding of all aspects of gravity thickening towards achieving better operational performance. Detailed studies of flocculation were complemented with mathematical and computational modelling, as well as both pilot and full-scale validation. In particular, the development of the world's most advanced computational fluid dynamic (CFD) model of feedwells has generated invaluable insights on designing and optimising feedwell flocculation under practical conditions.

AMIRA P266 treated flocculation and thickening as generic processes and its outcomes are relevant to all commodities and process flowsheets. Confidential projects (now >100) were conducted for the sponsors, from CFD feedwell optimisations through to flocculation problem-solving, achieving important performance enhancements at operations around the world. In the P266E project it was recognised the team had studied a sufficient quantity of feedwells under varying conditions to commence a data-mining process to draw-out generic design “rules-of-thumb” that also formed the basis of training on flocculation and thickening. This was further expanded in P266F with systematic CFD studies of different design and operation elements, leading to several feedwell self-assessment resources to allow sponsors to identify and potentially resolve issues. The most detailed of these was an online tool that captured interpretations for more than a dozen key elements of feedwell performance.

The key practical P266 outcomes and how these were brought together to provide technology transfer options for sponsors are described in this paper. A brief outline will be given of how some sponsors benefited from feedwell optimisation studies, and the key technical challenges for the future will be also be discussed.