CONSIDERATION OF FILTER DESIGN SPACE FOR VALIDATION OF VIRUS FILTRATION IN CONTINUOUS PROCESSING APPLICATIONS

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Continuous bioprocessing is rapidly gaining momentum, and seem likely to assume an increasing role in manufacturing in the coming years. This is due to the benefits of operational flexibility and efficiency, product consistency, increased quality assurance, and significant cost savings.

However, as with all new technologies, there are several challenges to address. These include establishing technical strategies to implement Quality by Design principles, and subsequently, process validation into a continuous bioprocess.

With continuous bioprocessing applications for monoclonal antibody (mAb) or recombinant proteins, one critical consideration involves assurance of viral safety. While robust virus clearance is well understood for batch processes, many questions remain on how to implement viral safety into continuous bioprocesses. For example, use of virus filtration in continuous bioprocessing is likely to involve low flow rates, and significantly extended processing times compared to current batch applications. Successful implementation will require a very thorough understanding of the virus filter design space.

Further, validation of virus filters for continuous bioprocessing will require innovative test design to be able to demonstrate robust viral clearance, while also simulating extended filtration times and low flow rates, often considered worst-case parameters for validation of virus filters in a batch mode.

Here we present data to show some of the process inputs that should be evaluated to determine critical control attributes for continuous bioprocessing applications. We also present data that show a robust virus filter design space is required for implementation into continuous bioprocessing applications. Specifically, our results show that over 7 logs of virus clearance can be achieved when simulating virus filtration in a low flux continuous bioprocess.