335h Baffling Approaches for Modern Axial-Flow Impellers

Kevin J. Myers, Eric E. Janz, and Julian Fasano

Achieving desired process objectives via mixing often requires generating an optimal flow field by the proper selection of impeller type, size, number, and placement within the vessel. Additionally, in low-viscosity systems, baffles are typically used to eliminate swirl and to promote the desired flow pattern. Generally a standard baffling configuration is used, with four vertical baffles spaced at ninety degrees around the vessel periphery and running the length of the vessel wall. Standard baffle widths are one-twelfth to one-tenth of the vessel diameter. The use of standard baffling is a convenient choice because it is supported by extensive design data and also provides good performance in most instances.

Standard baffling is based on laboratory studies and practical experience from at least forty years ago, and much has changed since that time. First, standard baffling was developed primarily from experience with radial-flow impellers, while axial-flow impellers are used almost exclusively for current blending and solids suspension applications. Further, many contemporary applications would like to reduce or eliminate baffling to improve cleanliness. And finally, the cost of baffling is not negligible, particularly if expensive materials are required.

Because of extensive experience with standard baffling, there is significant inertia against using different baffle arrangements. However, the desire to reduce baffling has grown to such an extent that this inertia is being overcome and alternative baffle arrangements are now being considered. This paper will demonstrate that contemporary axial-flow impellers require much less baffling than radial-flow impellers based on the effect of baffling on power draw, flow pattern, and process performance.