2 Introduction

Contents

2.1 The scope of this book

This second volume of the Hydrocyclones book grew out of a short course manual, just like the first volume published in 1984 (Ref. 1). That volume, besides being a leading text on the subject for almost three decades, has itself served as the course textbook since its publication. As post-experience courses on hydrocyclones—of both 'open' and 'in-house' variety—continued to boom, attended by well over a thousand participants in all, more and more supplemental notes have been needed to take into account further developments and research. Volume II is based on those extra notes from courses. It follows, therefore, that this book does not replace Volume I but supplements it. As Volume I is still in print and available from FPS, the two volumes between them now represent a comprehensive and up-to-date teaching text firmly grounded in industrial practice.

The present authors have tried to minimize duplication between the two volumes but some is inevitable. For example a short description of the hydrocyclone principle and of its applications in this chapter has been necessary because Volume II may sometimes have to stand on its own. Besides, we have now introduced a better way of illustrating the necessary changes in hydrocyclone geometry between those for separating light particles and for heavy particles. Other examples of necessary duplication may be found in the review of the theories, the series arrangements and the counter-current washing because these subjects needed major expansion or updating. So much so that counter-current washing now has its own Chapter 7.

In contrast, the effect of design variables was comprehensibly covered in Volume I and very little has happened in that area since (except for the effect of cyclone diameter, of course). The trend of fixed cyclone

'geometries' (i.e. sets of proportions in relation to internal body diameter) as identified in Volume I (Ref. 1, Table 5.1, p.60) has continued since and there are now very few people in industry, besides manufacturers, who would embark on designing their own proprietary 'geometry'. It is true that there have been some Computational Fluid Dynamics studies looking into the effect of some design proportions, but they tend to generally confirm the choice of design proportions and rules proposed before by the likes of Rietema or Bradley, who had nothing better than slide rules or log tables to use for their calculations. Chapter 5 on Hydrocyclone selection and sizing in this volume is much concerned with scale-up based on hydrocyclone internal diameter and the effect of it is shown there, for fixed sets of cyclone proportions (i.e. 'geometries').

We also need to mention what is **not** covered in this book, and why. First is heavy media separation, described in Section 2.3 below. This is a highly specialised application used almost exclusively in mineral processing (though some actual or potential uses may also be found in recycling). Having included this subject in our early hydrocyclone short courses, our feedback from the participants soon led to its omission in favour of topics chosen by popular demand. It obviously had much to do with the fact that the great majority of our participants have traditionally come from the chemical, pharmaceutical, power, nuclear and food industries rather than mineral processing, where hydrocyclones have been established for longest time anyway. So we soon left heavy media separation out with the exception of the 'water only' cyclones that invariably have wide angle or flat bottoms (sometimes called 'snub' cyclones) and strictly speaking don't fall in the heavy media category anyway. Readers interested in heavy media separation with hydrocyclones are referred to many excellent textbooks on the subject in mineral processing.

Two other subjects, while not completely omitted, are not represented by full text chapters but just two sections in the Appendix, listing the presentation style visuals and pictures used and distributed on our short courses. The subjects are hydrocyclones for liquid-liquid and gas-liquid ('de-gassing' of liquids) separation (Appendix A1 and A2). These are still fairly 'young' applications with the technology not yet developed enough for a definitive teaching text as required for this book. So the notes included here are intended to give just some basic rules and observations on the two subjects and by no means represent any design guides of the calibre found here for the more conventional and mature hydrocyclone types.