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PIPELINE ENGINEERING

6.1 INTRODUCTION

Offshore pipelines are structures used to transport hydrocarbon, chemicals, injection water, and gas from one location to another. Depending on its functions, a particular pipe may be further described based on its types, as shown in Figure 6.1.

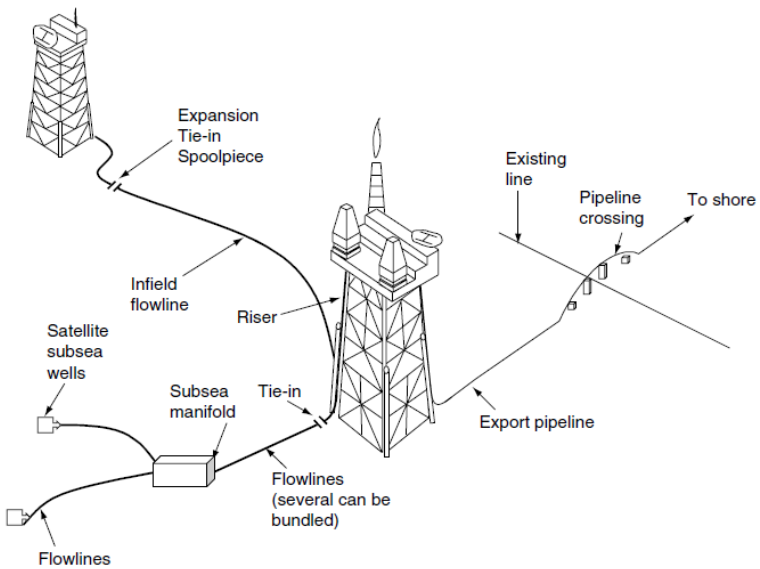

Figure 6.1 Different applications of offshore pipelines [68]

As depicted in the figure, pipelines can further be classified as infield flowlines, export pipelines, or trunk pipelines. Infield flowlines are used to transport hydrocarbon, water, or gas between the components of a field, for example, manifold and riser base, while export pipelines are used to transport hydrocarbon to other platforms or onshore. The trunk pipeline is the main pipe transporting the total amount of hydrocarbon, which is also known to cross boundaries over long distances.

A pipeline system can be grouped under different categories, namely single-pipe pipelines, piggybacked pipelines, pipe-in-pipe (PiP) pipelines, and bundle pipelines. The most common type being used in operations is the single pipe. The piggybacked pipeline comprises a secondary pipeline which is piggybacked to the preliminary pipeline, as shown in Figure 6.2a. Such a system eases the installation procedure as both lines are installed in one go. It also minimizes seabed intervention (trenching, backfilling, crossing etc.) as both pipelines are installed in one trench. On the other hand, the pipe-in-pipe (PiP) pipelines consist of two concentric pipes, as shown in Figure 6.2b, and the annulus can be filled in by a layer of insulation if required. The pipe provides low heat conductivity and good resistance against global buckling.

The bundle pipelines consist of different pipelines in one main pipe, as shown in Figure 6.2c. It provides the advantage of allowing all the fabrication work to be performed onshore and later bundle towed to the site. Thus several pipelines could be installed in one go. It also provides good and low heat conductivity. However, only a limited number of installation contractors have the specialities to handle such pipeline projects. Moreover, the installation location cannot be very far away from the onshore fabrication yard due to transport loads and fatigue, which may harm the pipelines. Due to their complicated design, the bundle pipelines are usually more suitable for short-distance routes.

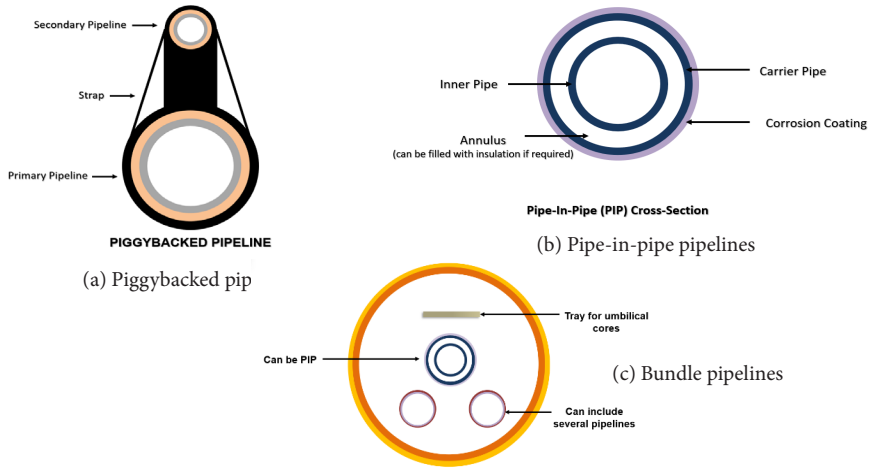

Figure 6.2 Types of pipeline systems