Extreme Pressure Equipments

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Abstract: Pressure equipments in the process industries and the newly developing industries usually have extreme sizes and/or are subjected to extreme operating conditions such as high pressure, blast loading, cryogenic temperature, elevated temperature, complex corrosion, and so on. In order to understand, research and develop these equipments systematically, a concept of extreme pressure equipments(EPEs) is proposed in this paper. The applications and demands of EPEs in petrochemical industry, coal chemical industry, advanced energy, military, space technology, and environment protection are introduced. Basic scientific problems in material, design, inspection, and safety related to EPEs are discussed. Then, take chemical composition, manufacturing process, service duration, and operating conditions for example, main factors which affect material properties of EPEs are analyzed. New design concepts including design based on life cycle, dynamic design and light-weight design are introduced. EPEs with higher efficiency, lower cost and safer performance are in urgent demand in national major projects including ten million ton oil refinery, one million ton ethylene, liquefied natural gas transportation, and nuclear power plant. Thus, further research should be conducted on information acquisition, multi-mechanism damage coupling model, damage inspection, life prediction, online safety monitoring, maintenance strategy, safety pre-warning system, and emergency system.

Key words: pressure equipment, pressure vessel, pressure pipe

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