This talk presents a new fixed grid fluid-structure interaction schema that can be applied to the interaction of most general structures with incompressible flow. It is based on an eXtended Finite Element Method (XFEM) based strategy. The extended Eulerian fluid field and the Lagrangian structural field are partitioned and iteratively coupled using Mortar methods for non-matching grids. The approach allows the simulation of the interaction of thin and bulky structures exhibiting large deformations. Finally, qualitative examples and a benchmark computation demonstrate key features and accuracy of the methods.