INTRODUCTION
This investigation attempts to address primary factors affecting research, development, and deployment of commercially viable composite materials for industrial applications, including but not limited to gathering, transmission and distribution systems. However this investigation shall dwell upon at a particular type of composite pipe. Comparing relative flexural strengths, composites are significantly more flexible than steel. This has several benefits, but is most relevant when combined with expansion coefficients in that fewer expansion joints are required in a composite pipe system. Composite are highly resistant to many corrosive chemicals and compounds, including H2S. Some pipelines, including the Trans Canadian pipeline have wrapped steel pipe with composites to improve the structural properties, while at the same time adding external corrosion resistance that the steel previously lacked. Composites are significantly lighter than steel. In fact, when strength-to-weight ratios are examined, composites can be much “stronger” than steel.

Composites also have higher strength and stiffness to weight ratios compared to traditional engineering materials such as steel and concrete. Their low weight can help reduce installation and repair costs. Another important advantage of composites is the designer’s ability to tailor the material properties for a specific application. High metal content provides maximum physical strength and high resin content provides maximum corrosion resistance. Thus the designer can combine these two elements to produce a satisfactory design.

The design and analysis of composite pipe is challenging and intricate problem. For the complete and accurate analysis of composite pipe, it is very necessary to recognize and utilize the factors which are imperative to design. This study establishes 3D CAD models of the needful configurations of composite pipes. Typical configuration under study could look like below (although the same is subject to revision based on studies and findings later).

Plain Metal pipe reinforcement with Plastic/ variants
Fiber reinforced with Plastic/ variants

The proposed study includes analysis of the displacement and stress distribution of the pipes under constant internal or external pressure by using FEA software.

PRESENT THEORY AND PRACTICES
A brief review of some selected references is presented below. According to Zhong Yue, Pipe failure accidents (bursting) are frequent in thermal power plants, and severely influence the safe and economic running of power generation units. The authors analyzed the possible causes and features of coated-after superheater pipe bursting in boilers. Taking the coated-after superheater pipe bursting accident in a power plant for an example, the authors conducted macroscopic topography analysis, running environment analysis, metallurgical analysis, chemical composition analysis and strength analysis of the bulged pipe, ruled out that the coated-after superheater pipe bursting was caused by superheating, and demonstrated that the bursting was caused by crack defect that had not been found during regular inspection. [1]

According to Kaveh Arjomandi, Farid Taheri, A sandwich pipe (SP) is an effective design alternative, providing effective load carrying capacity and thermal insulation to pipelines, especially when the pipe is going to be utilized in deep and ultra-deep water applications. However, the design and development of a reliable SP requires an in-depth understanding of the behavior of such a system under various loading conditions. In this paper, the behavior of SPs subject to pure bending, which is one of the governing loading conditions for offshore pipelines, is investigated. [2]

According to Huseyin Arikan, failure analysis of filament wound glass reinforced plastic (GRP) pipes made of Eglass/epoxy with an inclined surface crack under open-ended internal pressure. Test specimens are composed of six anti symmetric layers with (±55°) winding angles. Tests have been performed at seven different crack angles: 0°, 15°, 30°, 60°, 45°, 75°, and 90°, with crack-to-thickness ratio of a/t = 1/4:0.50. The burst strengths of the specimens were determined, and the dependence of the burst strength on the crack angle was examined. [3]

Avinash Parashar, Pierre Mertiny’s aim of this article is to examine the effect of fibre architecture/stacking sequence on the adhesive bonding strength of fibre reinforced polymer pipe sections. Finite element analysis was performed in conjunction with strength of material as well as fracture mechanics based criteria. Two separate stacking sequences of [(55m/1m)] and [(±10/30m)] were considered in this paper for the analysis. Results indicated a shift in the region of failure with respect to the stacking sequence of filament wound tubular structures. The proposed study helps in generating more practical applications for adhesively bonded FRP sections. [4]

Dr.Roberto Friassn, 4200-465 Porto, Portugal in this paper analyzes the effect of the polymer matrix non-viscoelastic behaviour in the mechanical behaviour of thick multilayered cylinders. The original contribution of this work is to provide novel approximate analytical solutions to compute the time-dependent internal stress state through the pipe thickness within the framework of nonlinear viscoelasticity theory. This work presents a novel analytical approach to calculate the time-dependent stress–strain state in nonlinear viscoelastic
Mehmet Emin Deniz Ramazan Karakuzu investigated the effect of seawater immersion on the impact behavior of glass–epoxy composite pipes. The FEA results of standard steel rectangular winding profile and the perforated sheet winding profile were compared with the standard steel pipe. Two types of winding profiles to be considered include rectangular winding profile and the perforated sheet winding profile. The FEA results of standard steel pipe and steel reinforced pipe will be compared with analytical results by experimental results respectively. The work will be focused in order to,

- Evaluate the stress distribution and bursting pressure.
- Find the alternative design as a replacement for conventional steel piping structures.

The above work is planned in following phases.

**Phase I:**
- Detailed literature review is to be carried out at initial stages. Collection of literature from various available resources and thorough study of relevant literature is involved in this phase.
- Study of the concepts in reinforced metal composite piping design, materials and strength requirements.

**Phase II:**
- Selecting an existing standard design of metal/polymer pipe for study.
- CAD modelling of the selected design.
- Stress distribution and path displacement analysis of the modelled pipe.

**Phase III:**
- Selecting the variant of reinforcement.
- CAD modelling of the selected designs.
- Stress distribution and path displacement analysis of the modelled reinforced pipe design.

**Phase IV:**
- In addition to the CAE analysis, experimental investigations will be carried out for the reinforced pipes.
- Obtaining the comparative inference between the conventional pipe structures and proposed alternate composite pipes with any two variants.
- Proposing the alternate design for pipe with associated cost and/or weight reduction and/or thermal insulation benefits.

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7. Stress analysis of adhesively bonded sandwich pipe joints subjected to torsional loading G.P. Zou, F. Taheri
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**PROPOSED WORK**

The purpose of this study is to investigate finite element models of composite pipes to analyze them in order to evaluate their performance. The detailed work includes modelling & analysis of two types of winding profiles used in steel reinforced plastic pipes and its comparison with the standard steel pipe. Two types of winding profiles to be considered include rectangular winding profile and the perforated sheet winding profile. The FEA results of standard steel