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# "TRANSIENT THERMAL ANALYSIS OF ENGINE CYLINDER FIN BY USING ANSYS SOFTWARE"

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## ABSTRACT

***In the present study, erosion wear of a 90° degree with 2.5 bend ratio pipe, 90° degree with 1.5 bend ratio, 45° degree with 1.5 bend ratio, 60° degree with 1.5 bend ratio, 30° degree with 1.5 bend ratio pipe bend has been investigated using the Computational fluid dynamics code FLUENT. Solid particles were tracked to evaluate the erosion rate along with k-ε turbulent model for continuous/fluid phase flow field. Ash - solid are injected from the inlet surface at velocity ranging from 8 ms$^{-1}$ at two different concentrations. By considering the interaction between solid-liquid, effect of velocity, particle size and concentration were studied. Erosion wear was increased exponential with velocity, particles size and concentrations. Predicted results with CFD have revealed well in agreement with experimental results. it is cleared that results on 90° degree with 2.5 bend ratio pipe has low erosion DPM rate compared to all different bend angle and its results is better than all bend angle pipe with all parameters . so we can suggest this modified geometry of bend pipe with 2.5 bend ratio 90 degree because it has less DPM erosion rate and reduce the leak problem bend pipe surface.***

***Key Words:*** *Pipe bend, angle, temperature, CFD.*

## I. INTRODUCTION

The aggregate of stable debris and beverages is called slurry, which via the distribution of pipelines to chemicals, coal, food, minerals, oil production, thermal strength stations and lots of different industries. Common examples of metallic are: sand-water slurry, ash-water slurry, coal-water slurry, coal slurry etc. The waft of slurry is likewise called multiphase, wherein the rate of stable debris ought to be enough to hold a set shape. The waft of a unmarried section is called the equal waft among all of the waft forces, whilst the waft of the slide behaves in another way and is comparable relying at the stable consciousness in it. Large range of parameters that make contributions to slip waft waft adjustment / canal length, particle length distribution (PSD), particle length, particle density, stable concentration, velocity waft etc.

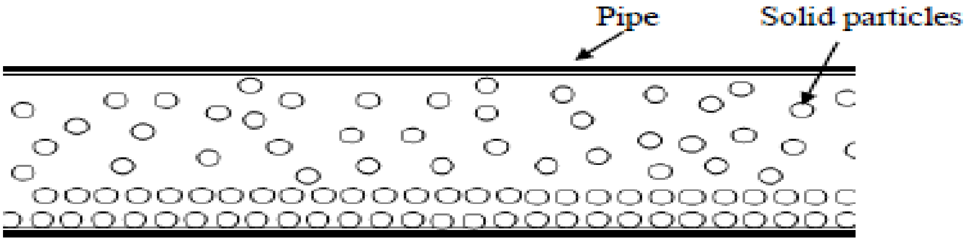

**Figure 1.1: Settling slurry in pipe-line**

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**□Non-Settling slurry**

In non-fixing cables the solid particles of the current are very environmentally friendly and are evenly distributed in the flowing region that forms the same compound as shown in Figure 1.6. However the slurry behaves like a viscous in manners along with non-Newtonian characteristics.

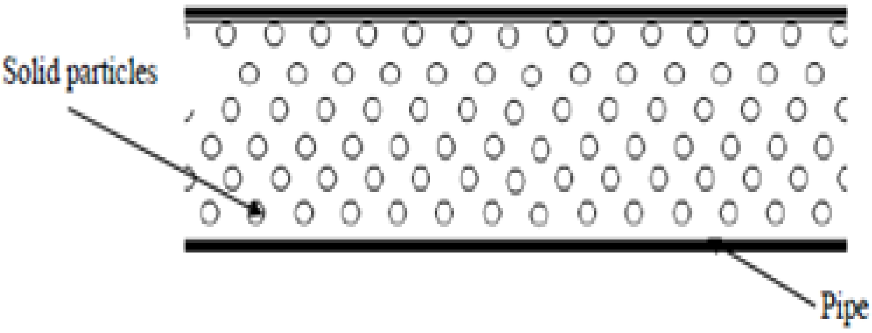

**Figure 1.2:** Non- settling slurry in pipe-line.

## II. SOLID LIQUID EROSION WEAR USING CFD

In the existing work, CFD ANSYS 19.2 multiphase euler-lagrange version is used to discover the erosion fee and to research the consequences of pace, debris size, and strong attention for the erosion put on in pipe-bend. The erosion put on takes area normally in strength plant life because of transportation of slurry (water-backside ash) via pipe-line machine because of excessive pace and affects of strong particulates over the wall of the go with the drift domain.

**Table 2.1: Detail and Specification of the flowing domain**

| **Geometry:** Pipe-Bend | | | |
|---|---|---|---|
| **Diameter, D (mm)** | **r/D ratio** | **Total length, L (m)** | **Density (kg/m3)** |
| 50 | 1.5 | 1.5 | 7850 (Steel) |

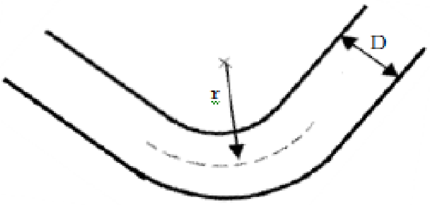

**Fig. 2.1: Schematic diagram of horizontal pipe-bend**

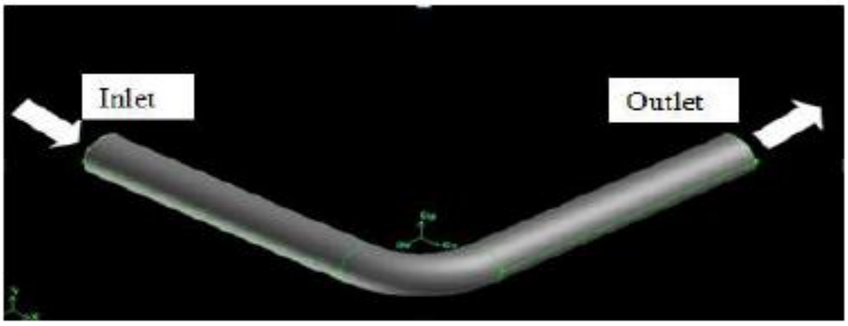

**Fig. 2.2: 900 horizontal pipe-bend**

## III. SIMULATION

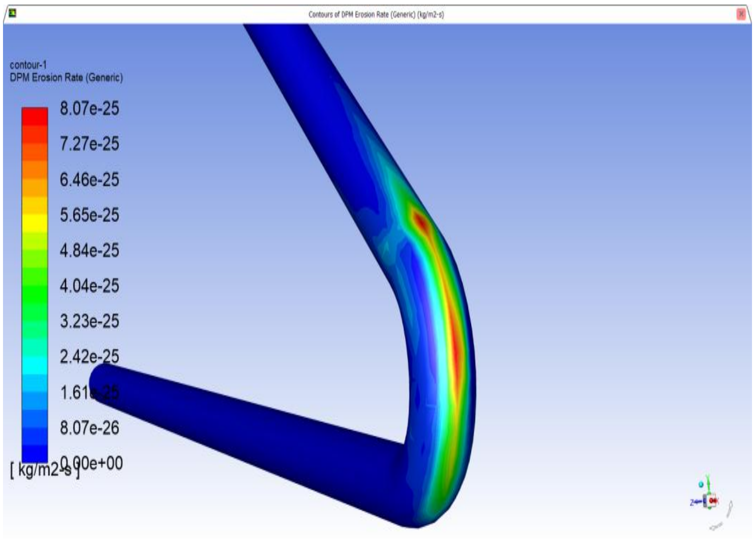

**Fig. 3.1 30° Degree Elbow DPM erosion rate zoom results**

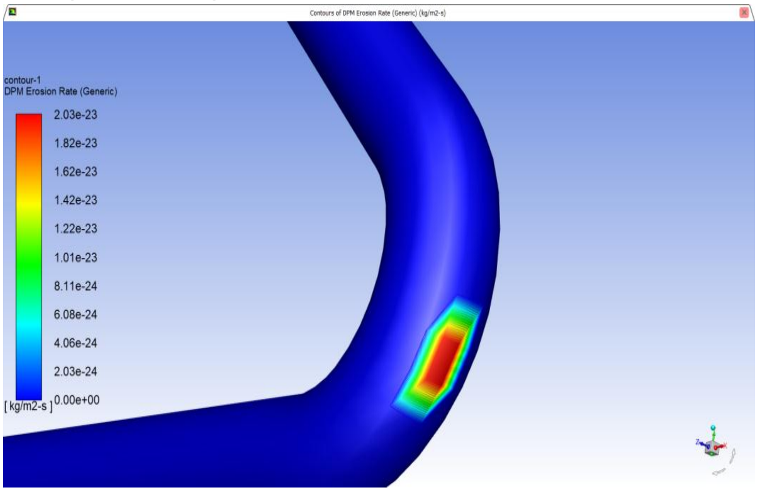

**Fig. 3.2 45° Degree Elbow DPM erosion rate zoom results**

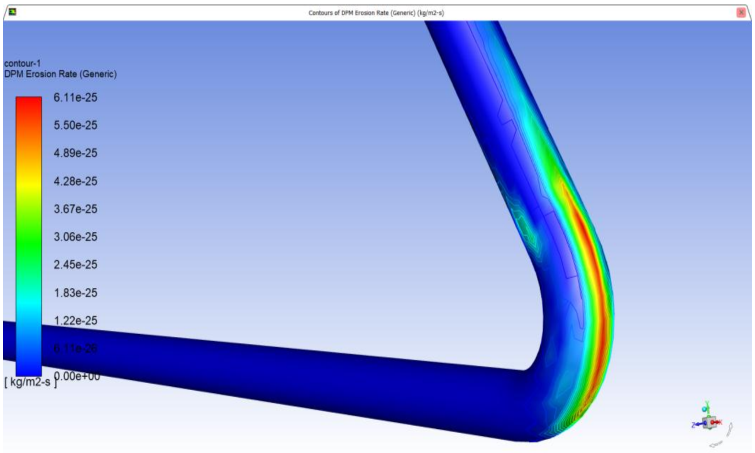

**Fig.3.3 60° Degree Elbow DPM erosion rate zoom results**

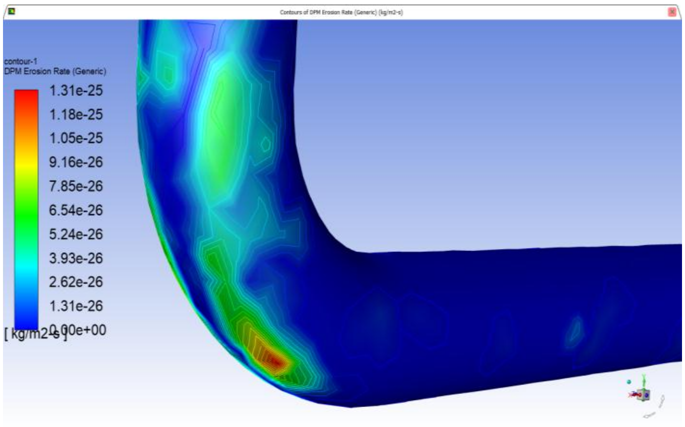

**Fig.3.4 90° Degree Elbow DPM erosion rate zoom results**

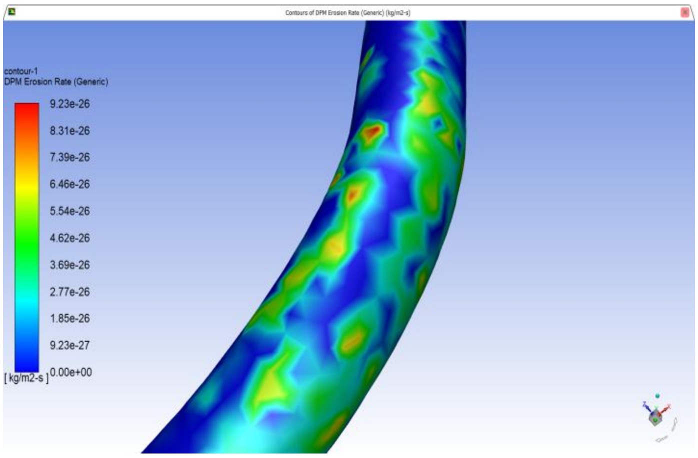

**Fig. 3.5 90° Degree Elbow DPM erosion rate zoom results**

## IV. RESULT

Here bend pipe DPM erosion rate results on 90° degree with 3.5 bend ratio pipe, 90° degree with 2.5 bend ratio pipe, 90° degree with 1.5 bend ratio, 0° degree with 1.5 bend ratio, 45° degree with 1.5 bend ratio, 60° degree with 1.5 bend ratio, 30° degree with 1.5 bend ratio results are respectively 9.35E$^{-26}$ kg/m$^2$s, 9.57E$^{-26}$ kg/m$^2$s, 1.31E$^{-25}$ kg/m$^2$s, 1.26E$^{-23}$ kg/m$^2$s, 6.11E$^{-25}$ kg/m$^2$s and 8.07E$^{-25}$ kg/m$^2$s

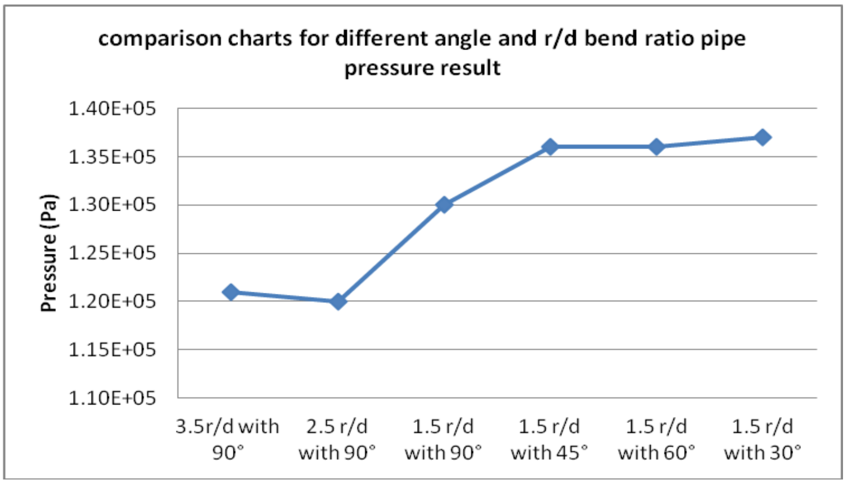

**Fig. 4.1 comparison charts for different angle and r/d bend ratio pipe pressure result**

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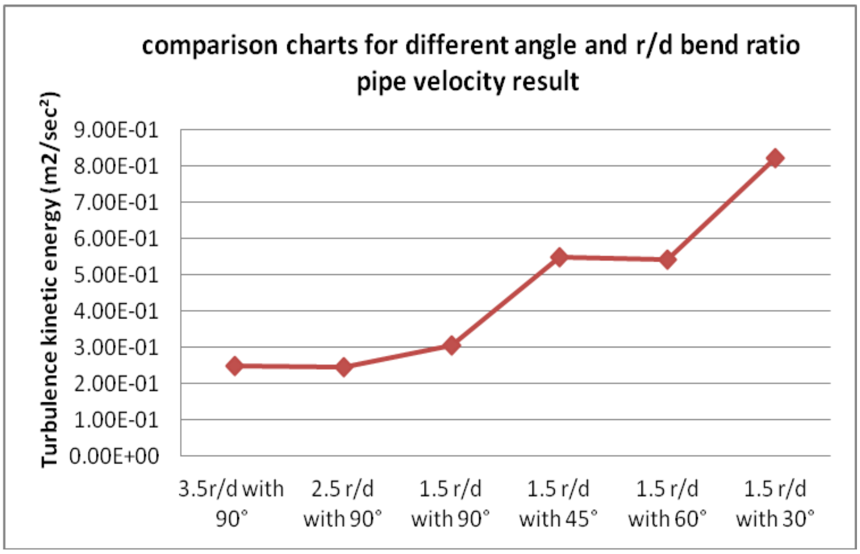

**Fig. 4.2 comparison charts for different angle and r/d bend ratio pipe velocity result**

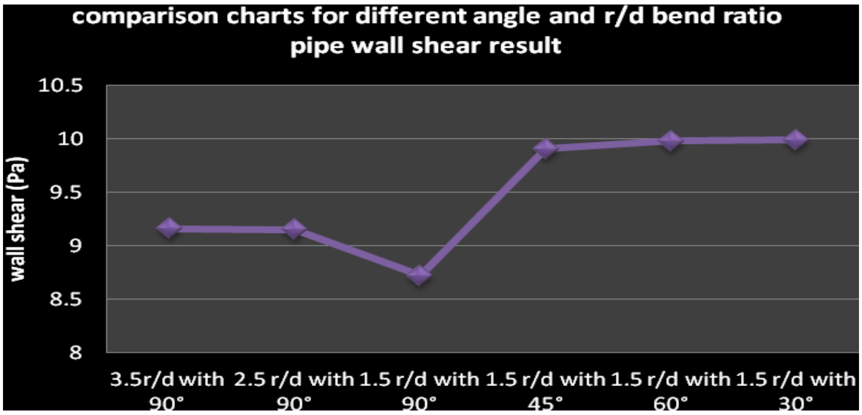

**Fig. 4.3 comparison charts for different angle and r/d bend ratio pipe wall shear result**

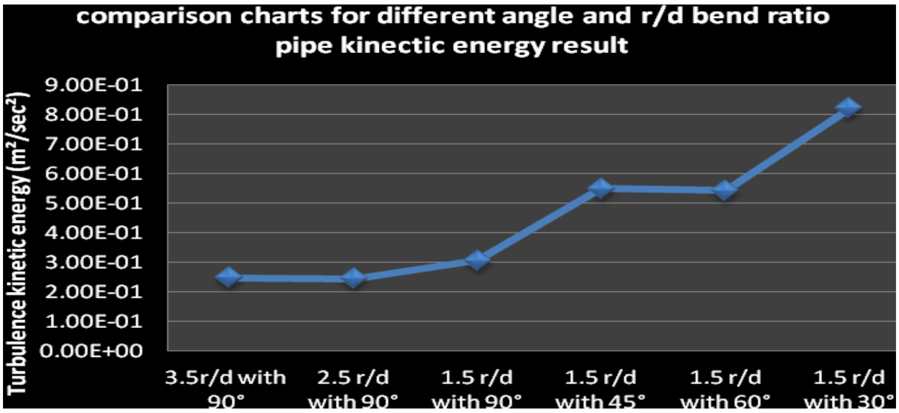

**Fig. 4.4 comparison charts for different angle and r/d bend ratio pipe kinectic energy result**

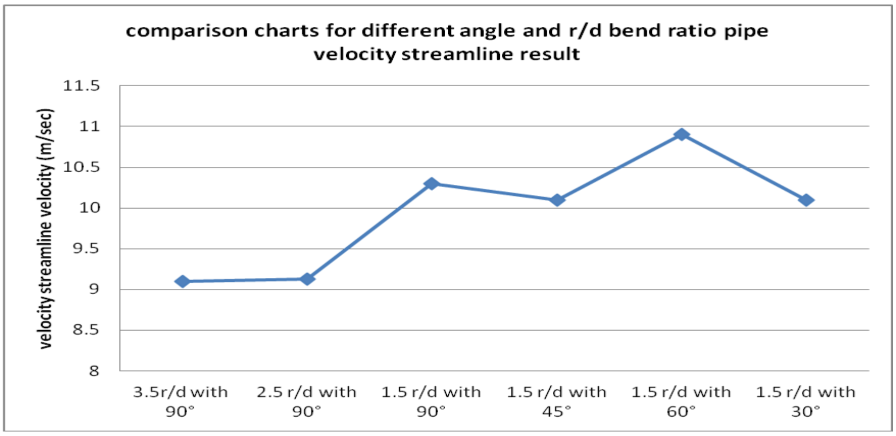

**Fig. 4.5 comparison charts for different angle and r/d bend ratio pipe velocity streamline result**

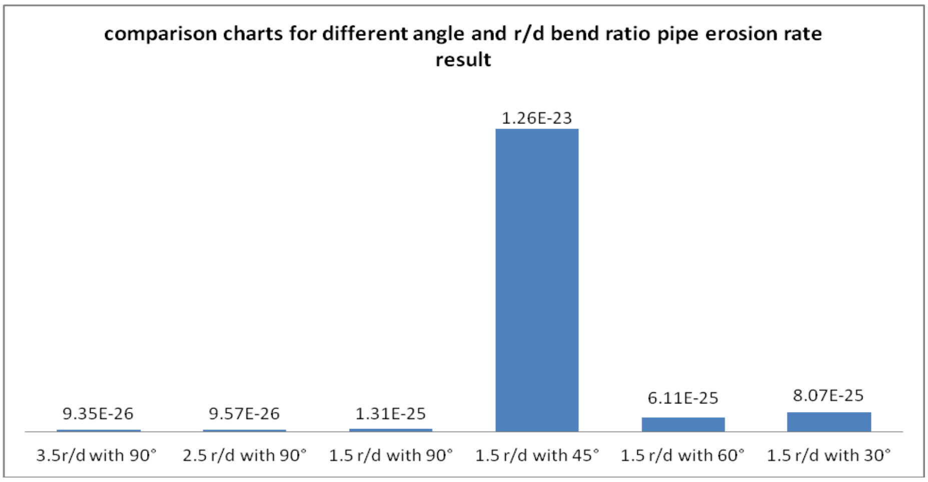

**Fig. 4.6 comparison charts for different angle and r/d bend ratio pipe erosion rate result**

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