

616018: MAJOR MECHANICAL ENGINEERING

KEY WORD: FLEXIBLE DUCT/HEAT TRANSFER/CURVATURE EFFECT/FRICTION/
FLUID FLOW

TEERACHART PORNPIBUL : CURVATURE EFFECT STUDY ON HEAT TRANSFER AND
FRICTIONAL RESISTANCE IN ALUMINIUM FLEXIBLE DUCTS.

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The objective of this research is to analyze the impact of curvature of the aluminum flexible duct on heat transfer and friction loss. The aluminum flexible duct was heated through its surface by the constant heat flux method in the air turbulence region ($30000 \leq Re \leq 120000$). The study also included the investigation of the effect of roughness of aluminum flexible duct as well as heat transfer and frictional resistance at the entrance.

Samples used for this research were consisted of aluminum flexible ducts which can be classified into four groups as follows : (1) straight duct with 0.5 m in length ; (2) straight duct with 1 m in length ; (3) 90 - degree curve duct with 0.5 m in length ; and (4) 90 - degree curve duct with 1 m in length .

Results from the study can be summarized as follows ;

1. The average Nusselt numbers of straight ducts tend to increase as the duct lengths decrease at the same ranges of amplitude and the flow rates .
2. The average Nusselt numbers of curve ducts tend to increase as the radius of the duct curvature decreases at the same ranges of amplitude and the flow rates.
3. The average Nusselt numbers of both curve and straight ducts tend to increase as the amplitude increases at the same ranges of duct lengths and the flow rates.
4. The average Nusselt numbers of 90 - degree curve ducts are approximately 175% higher than those of the straight duct at the same ranges of amplitude and the flow rates .
5. The pressure drops of straight ducts tend to increase as the duct lengths increase at the same ranges of amplitude and the flow rates.
6. The pressure drop of curve ducts tend to increase as the radius of the duct curvature increases at the same ranges of amplitude and the flow rates.
7. The pressure drops of both curve and straight ducts tend to increase as the amplitude increases at the same ranges of the duct lengths and the flow rates.
8. The pressure drops of the 90 - degree curve ducts are approximately 250% higher than those of the straight ducts at the same ranges of the amplitude , the duct lengths , and the flow rates.

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