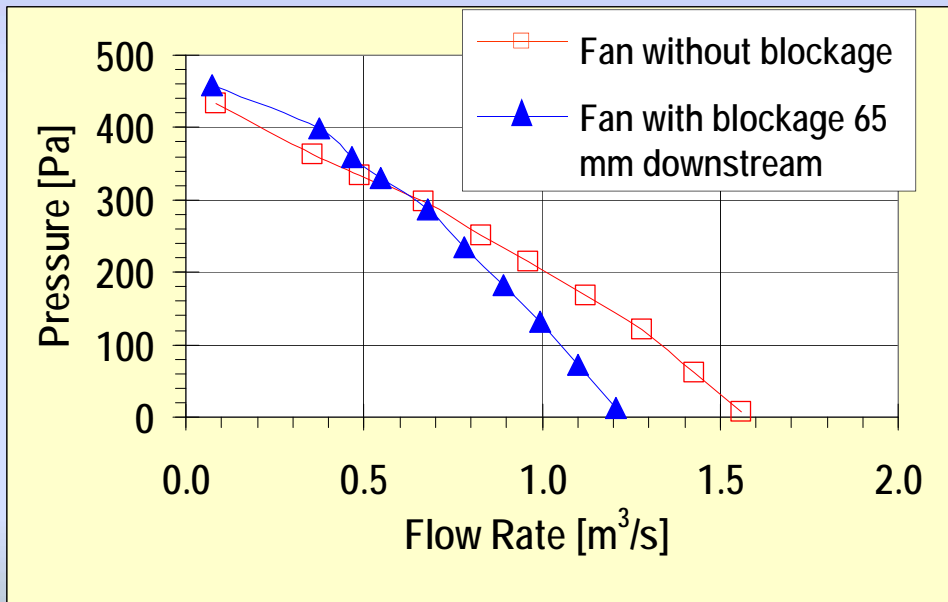


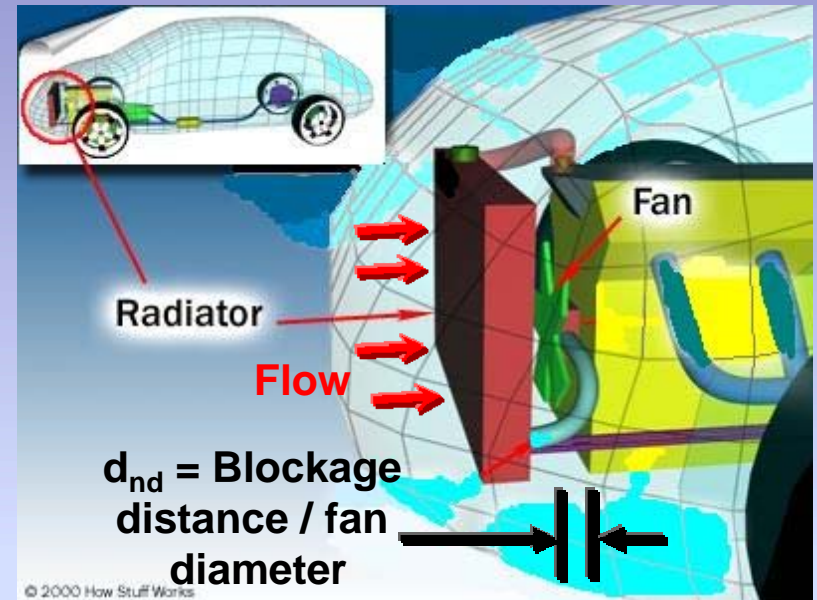
AXIAL FAN PERFORMANCE – MODELING IN-SITU EFFECTS OF BLOCKAGE BEHIND THE FAN

Background

Performance of axial cooling fan modules may be dramatically effected by blockage behind the fan, especially in vehicles.



Fan characteristic curves for a module tested with and without blockage



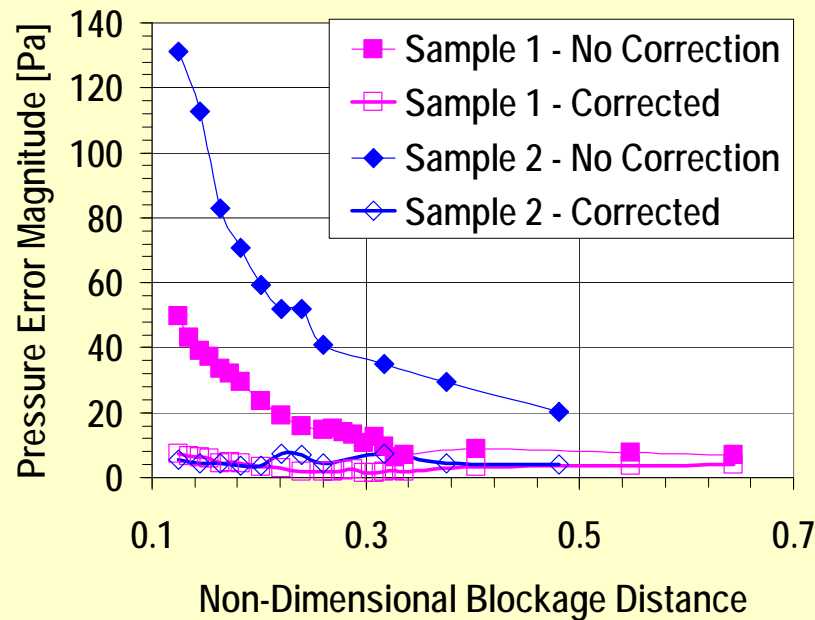
Schematic demonstrating the cramped conditions of an axial fan application

Objective

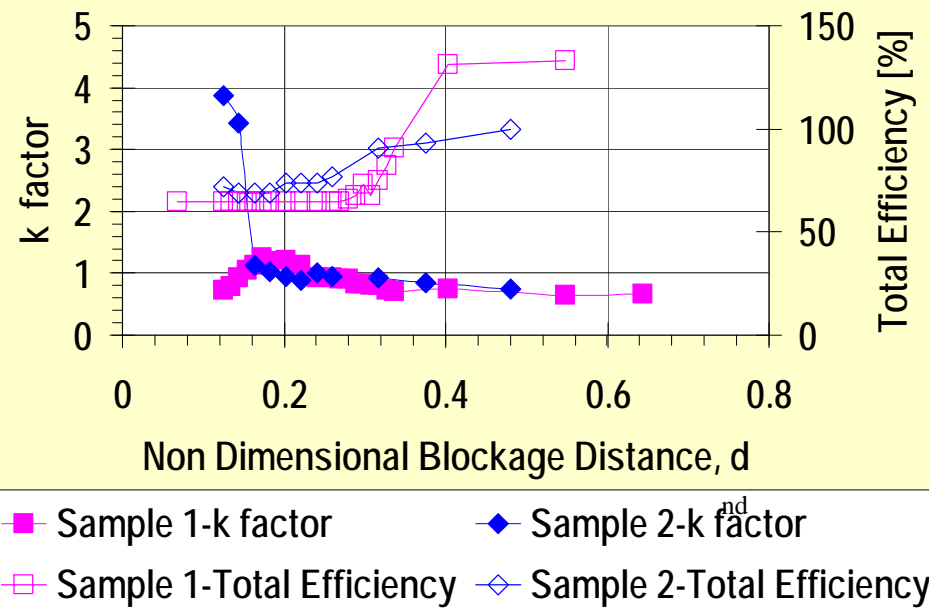
Develop analytical and/or empirical models to predict the downstream pressure changes.

Research Carried Out

Two fans were tested for a range of blockages and an analytical model was derived and compared to the test data. The model corrects fan data for effects of blockage.



Reduction of pressure error through application of the new model



Variation of k factor and total efficiency with blockage distance

Key Findings

The model predictions reduced the difference between blocked and unblocked pressure curves from 130 to 7 Pa. The (pressure loss) k -factor results diverged at distances less than $d_{nd} = 0.16$.