Vehicle ventilation design

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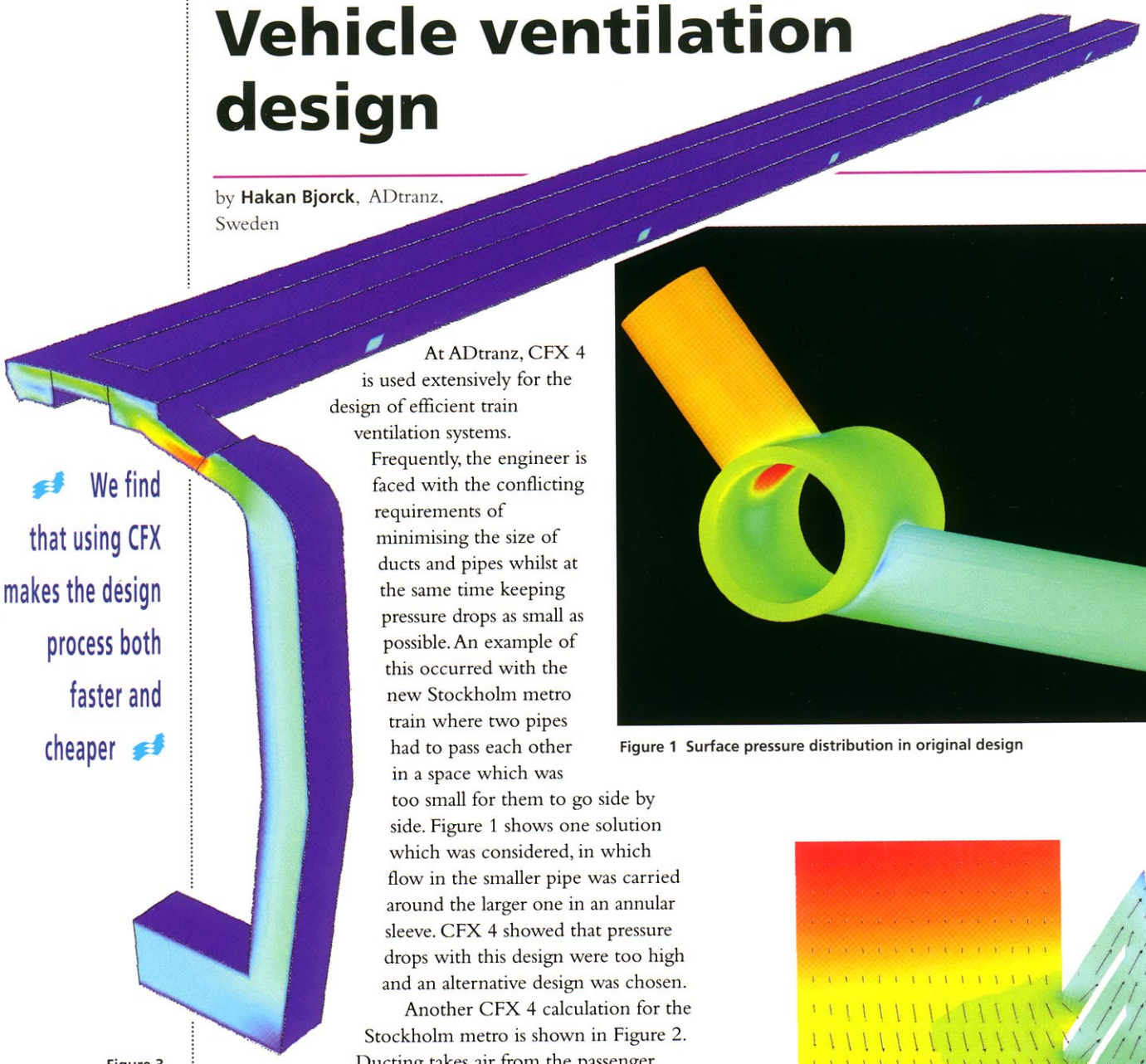

We find that using CFX makes the design process both faster and cheaper

At ADtranz, CFX 4 is used extensively for the design of efficient train ventilation systems.

Frequently, the engineer is faced with the conflicting requirements of minimising the size of ducts and pipes whilst at the same time keeping pressure drops as small as possible. An example of this occurred with the new Stockholm metro train where two pipes had to pass each other in a space which was too small for them to go side by side. Figure 1 shows one solution which was considered, in which flow in the smaller pipe was carried around the larger one in an annular sleeve. CFX 4 showed that pressure drops with this design were too high and an alternative design was chosen.

Figure 1 Surface pressure distribution in original design

Another CFX 4 calculation for the Stockholm metro is shown in Figure 2. Ducting takes air from the passenger compartment and vents it outside the train through an array of noise-absorbing baffles. Full scale experimental tests confirmed the accuracy of the CFX 4 predictions as better than 90%.

Figure 3 shows CFX 4 calculations of the flow in the carriage ventilation ducts of the shuttle for Oslo's new Gardermoen airport. An under-floor fan provides air through a duct in the carriage wall to the roof-mounted distribution channels and then through openings to the carriage interior. CFX 4 was used to determine the optimum position of the outlets in the distributor to ensure uniform ventilation of the compartment.

ADtranz finds that using CFX makes the design process both faster and cheaper. Making changes to the computer model is easy and allows poorer designs to be eliminated early on, leaving expensive experimental models to be used only at the final stage to verify the calculations and to fine-tune the design.

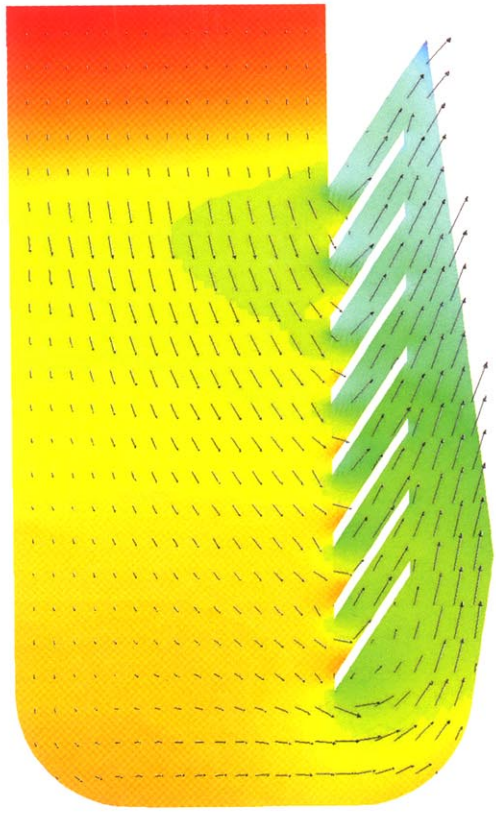

Figure 2 Flow through noise-absorbing baffles

Figure 3 Carriage ventilation ducts