

Abstract

In the last years great progresses have been achieved in the design of efficient engines for automobiles. However, the better the engines become with respect to fuel consumption, the less waste heat is available for a quick heat-up of the passenger compartment. This makes supplementary heaters necessary for a fast warm-up at low ambient temperatures. For this purpose the utilization of the R744 refrigerant cycle seems to be a promising solution. This can be realized either by reversing the refrigerant process to a heat pump cycle with the coolant or the ambient air as the heat source, or by a quite simple hot gas cycle.

This paper describes the analysis of a refrigerant cycle that can be used for cooling and heating by switching the conventional refrigerant cycle to an air/air heat pump, a coolant/air heat pump or a hot gas cycle. The different systems have been investigated by means of experiments and numerical simulations. All systems are based on the R744 refrigerant circuit

of the air conditioning system and they are therefore suitable for heating and cooling of the passenger cabin.

It has shown that rather large heating capacities of more than 2.4 kW can be achieved with the heat pump systems even at unfavourable operating conditions (low compressor speed and low air flow rate). For the hot gas cycle a maximum heating capacity of 1.1 kW was obtained at the investigated conditions.

Key Words: *mobile air conditioning, R744, hot gas cycle, heat pump*