

Carbon Dioxide – new uses for an old refrigerant

Carbon dioxide has been used as a refrigerant in vapour compression systems of many types for over 130 years, but it is only in the last decade that inventive minds and modern techniques have found new ways to exploit the uniquely beneficial properties of this remarkable substance. This paper traces the development of the old carbon dioxide systems, considers the technical, commercial and social reasons for their slow development and subsequent decline and examines the recent renaissance across a surprisingly broad range of applications, from trans-critical car air conditioners to low temperature industrial freezer plants. The paper then concentrates on industrial refrigeration systems, which were the basis of early developments in the period 1865-1885, but which have been somewhat overlooked in the current renaissance. The paper concludes with a review of possible future developments, indicating the areas of research and product development required to maximise the potential of the only non-toxic, non-flammable, non-ozone-depleting, non-global-warming refrigerant available for Rankine cycle vapour compression systems in the twenty first century.

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