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Sommario/riassunto	Long description: Compared to diesel or gasoline, using compressed natural gas as a fuel allows for significantly decreased carbon dioxide emissions. With the benefits of this technology fully exploited, substantial increases of engine efficiency can be expected in the near future. However, this will lead to exhaust gas temperatures well below the range required for the catalytic removal of residual methane, which is a strong greenhouse gas. By combination with a countercurrent heat exchanger, the temperature level of the catalyst can be raised significantly in order to achieve sufficient levels of methane conversion with minimal additional fuel penalty. This thesis provides fundamental theoretical background of these so-called heat-integrated exhaust purification systems. On this basis, prototype heat exchangers and appropriate operating strategies for highly dynamic operation in passenger cars are developed and evaluated.