

# NEW DESIGN METHOD OF INLETS AND OUTLET NOZZLES OF TURBIPROP ENGINES

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## Abstract

*Design of three-dimensional channels, like some inlets and outlet nozzles of turboprop engines is a difficult problem known as the indirect solution in internal aerodynamics. The presented design method helps to perform this solution in more efficient way. It is based in principal on a mechanical geometrical construction of the flow field between defined inlet and outlet sections of the channel and respecting other space limitations resulting in a whole engine design. The designed flow is represented by a finite number of materialised flow tubes, which lengths, cross section and spatial course are defined by special design criteria. These take also into account the influence of viscosity and minimise the energy loss caused by secondary flow.*

*The method was applied on the design of Walter M 602 inlet channel of the three-shaft turboprop engine and the aircraft L 610 inlet and also on the Walter M 601 two-shaft turboprop engine outlet channel design.*

*Both new designed channels proved excellent aerodynamic properties and satisfied all airworthiness requirements. The improved engine with the new outlet nozzle, that is by 1 kg lighter and fully interchangeable with the original one, attains higher maximum performance by more than 3% at the same absolute fuel consumption and lower temperature of the gases.*