



# Technical Paper

## Basic Research & Development

### Session 3-3

## Solution of the Suction Piping Design for the Large Fluid Transport Pumps

**Author:**

**Franci Vehar**  
Researcher  
Turboinštitut d.d.  
1000 Ljubljana, Slovenija

**Co-Author 1:**

Dr. Dušan Florjančič  
Consultant to ILF  
4274 Žirovnica, Slovenija

**Co-Author 2:**

Sigbert Buchegger  
Managing director  
ILF Consulting Engineers  
18600 Prague, Czech Republic



## Summary

Single stage double suction pumps could suffer due to unsymmetrical inlet flow conditions - change of Q-H characteristics, cavitation problems, unacceptable vibrations and noise. Recommendations exist for the suction piping configuration in order to obtain optimal technical as well as economical solutions.

The article shows the disposition of the suction piping in the already partially executed pump plants, which differ from the recommendations due to economic reasons. Pump plants are vital objects in large crude oil transport system Baku - Tbilisi - Ceyhan (BTC). Due to limitations in any change of civil works, investigation was initiated in order to solve the problem and obtain the optimal solution.

The investigation was carried out at Turboinstitut – CFD<sup>1</sup> and tests with air in parallel. In the first step comparison of both results was done and it showed very good agreement. Next steps were carried out only by means of CFD. In a short time different modifications of the suction piping were studied - introduction of different ribs, strainers and confusers and their combinations at different places. Based on recommended (required) allowed velocity profiles (meridian velocity distribution and angle of prerotation) final solution was chosen and additional air tests were conducted. They fully confirmed the results, obtained by CFD.

The suction piping in pump plants was redesigned according to the final solution of the investigation. Pump plants have already been put in operation and results with pumps confirm the chosen solution, no difficulties have been detected. The described investigation method confirms that it is possible to find out acceptable optimal solution in a very short time even in the case, where the plant suction piping configuration diverges from the known guidelines.

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<sup>1</sup> Computational fluid dynamics