Università degli Studi di Napoli Federico II

Scuola Politecnica e delle Scienze di Base

Corso di Studi in Ingegneria Meccanica

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Elaborato di Laurea

3D Fluid dynamic analysis of a new directional seated valve for hydraulic applications

Relatore:
Ch.mo Prof. Ing. Adolfo Senatore
DII - Dip. di Ingegneria Industriale

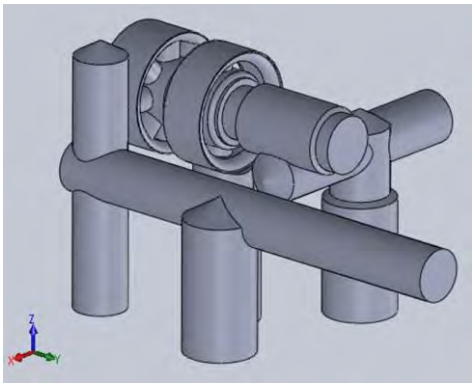
Correlatore:
Ing. Emma Frosina
DII - Dip. di Ingegneria Industriale

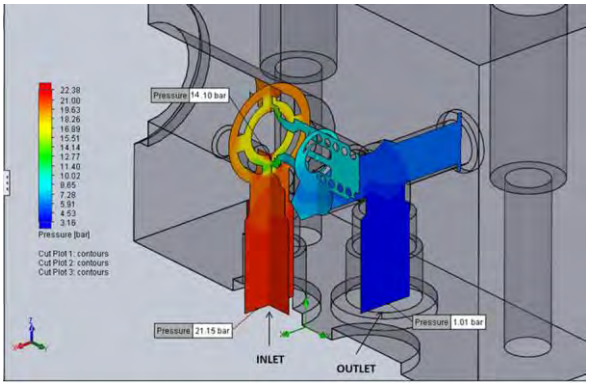
Ing. Michele Pavanetto
Duplomatic Oleodinamica S.p.A.

Candidato:
Colarusso Vincenzo
matr. M65/000240

SUMMARY

In this script a 3D-fluid-dynamic analysis of a sealing valve with conical seat to characterize its hydraulic performance is described. Non-optimized hydraulic valve geometry is usually the main cause for many problems related to switching time, actuation force and energy consumption. Numerical and experimental analysis of the valve it has been done to overcome these limitations and problems. The main influential geometry parameters of the seat valve, such as the sealing edge and the flow area in the throat section, are been defined for numerical analyses. The basic theory of the numerical simulation, including 3D modeling, meshing and parameterization, such as turbulence and cavitation effects, are explained. In more detail, the baseline configuration of the three-way and two-position seated valve has been studied with the mathematical model "Flow-Simulation by SolidWorks® Inc" that was validated with experimental data from the Hydraulic Lab of the Duplomatic Oleodinamica S.p.A. In the last section, a comparison with a more accurate 3D CFD code such as PumpLinx® by Simerics Inc. ®, is been made. The results obtained from this comparison have shown a higher gap between the "Flow Simulation" results and the experimental ones in comparison to the "PumpLinx" results.





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