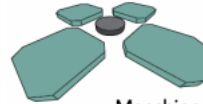




UCIMU-SISTEMI PER PRODURRE



Bologna, 12-15/5/2010



**MUSP**

Macchine Utensili e Sistemi di Produzione



**POLITECNICO  
DI MILANO**



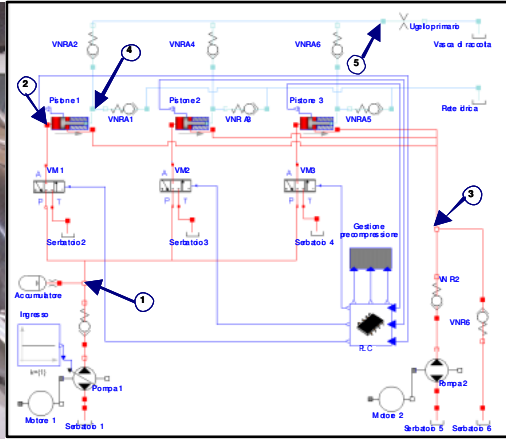
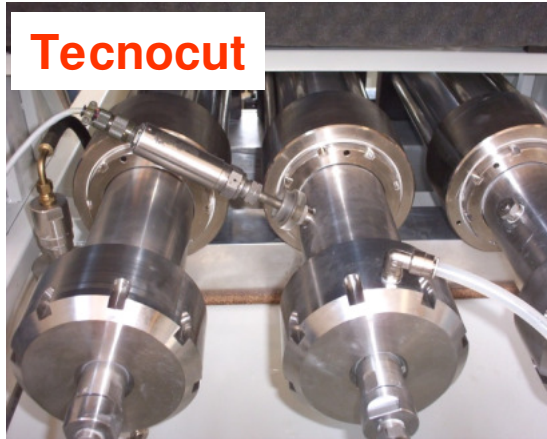
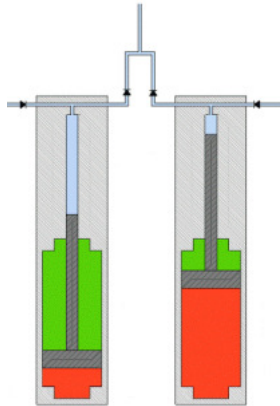
## **Prestazioni a confronto: analisi degli intensificatori di pressione presenti sul mercato**

**13 Maggio 2010**

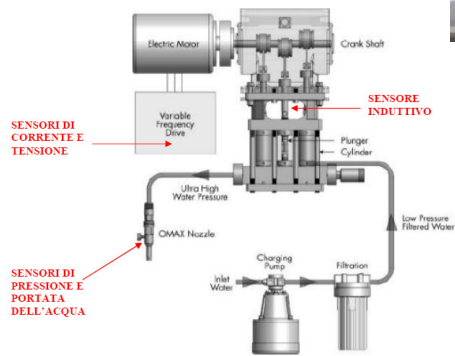
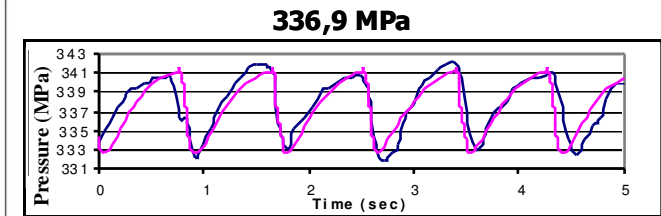
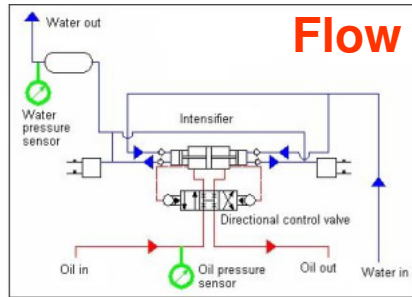
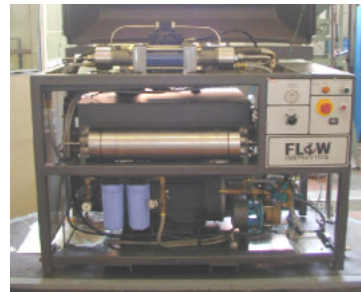
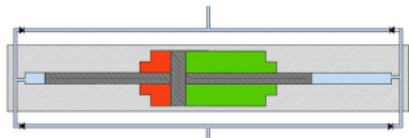
Massimiliano Annoni  
[massimiliano.annoni@polimi.it](mailto:massimiliano.annoni@polimi.it)



# Pump architectures



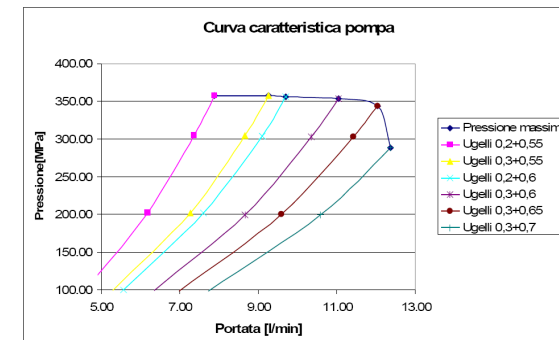
- Portata, pressione
- Complessità
- Affidabilità
- Efficienza
- Costo e durata dei consumabili



Omax



Hammelmann





# Modelling the plant behaviour with Dymola

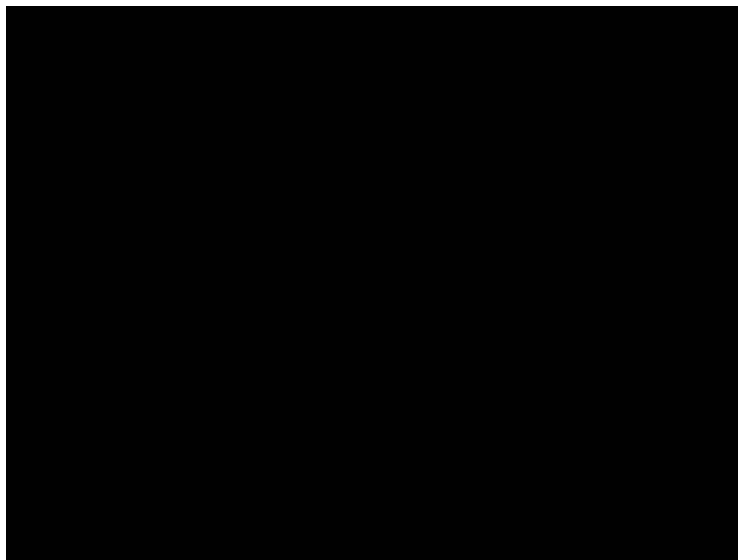
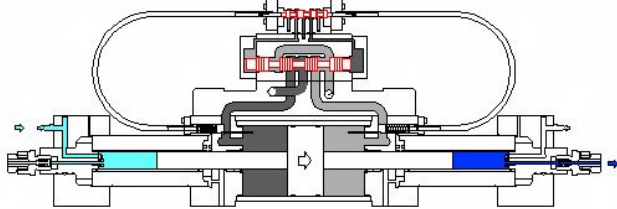
Red: Hydraulics (oil)

Green: Translational Mechanics

Black: Rotational Mechanics

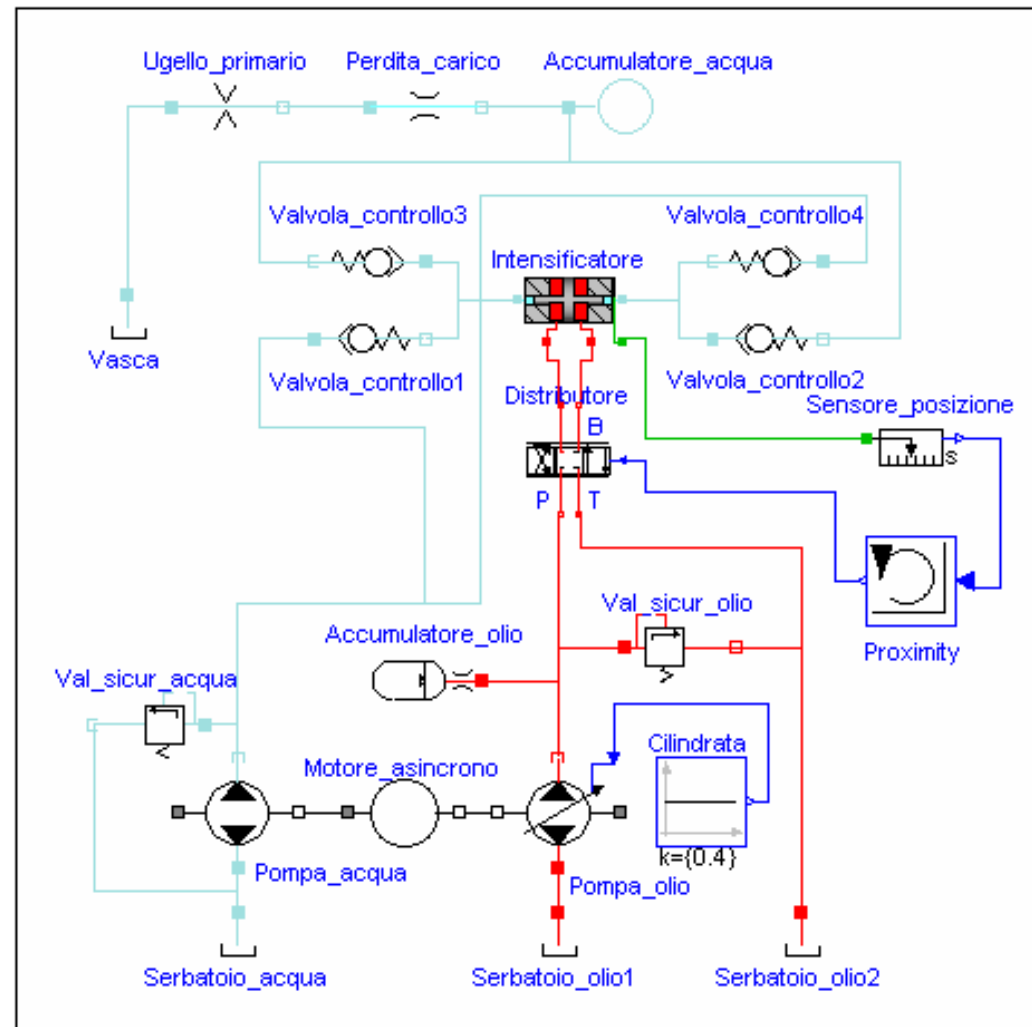
Blue: Electronics

Light blu: Hydraulics (water)



Flow Corp.

## SKETCH OF THE WHOLE MODELLED SYSTEM



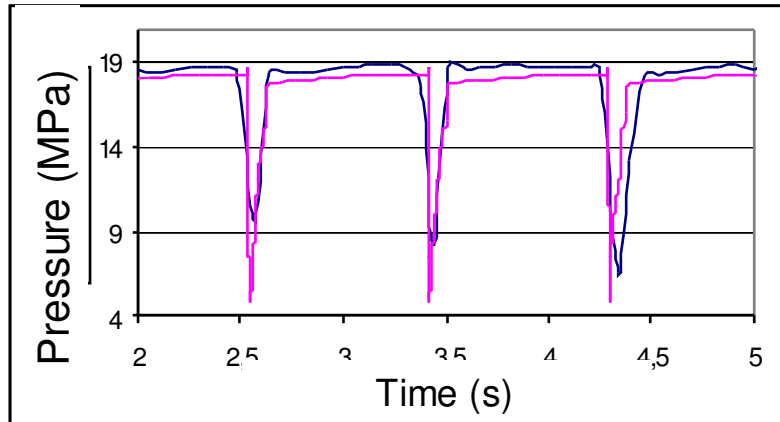


# Modelling the plant behaviour with Dymola

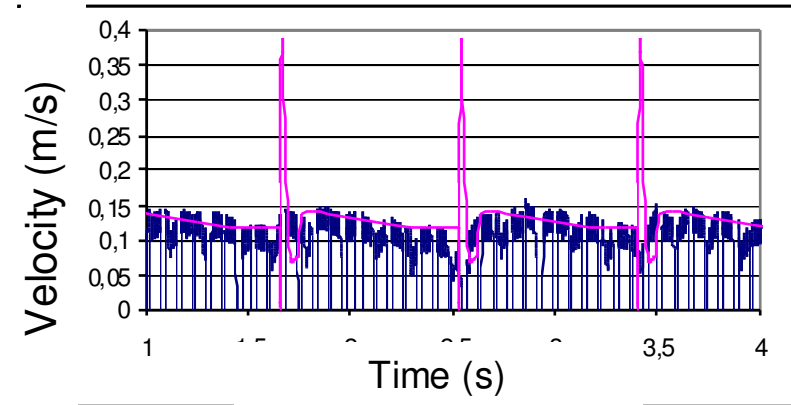


336 MPa

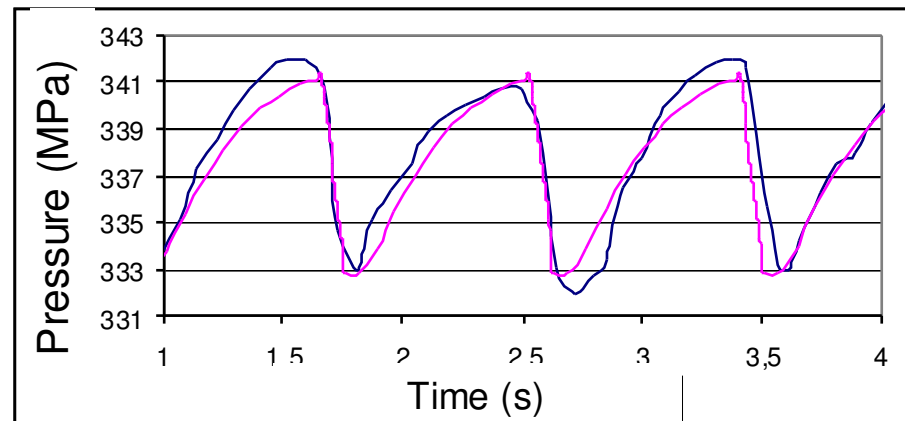
Oil Pressure



Piston Velocity

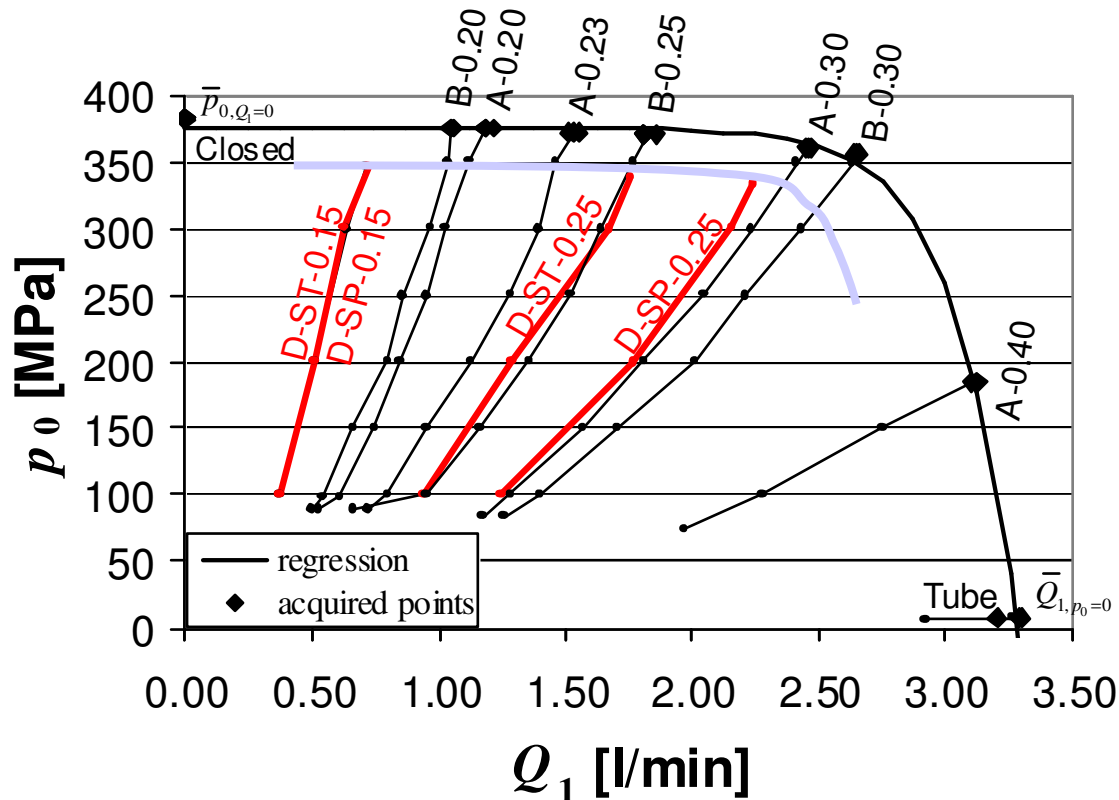


Water Pressure





### Flow 9XV-S

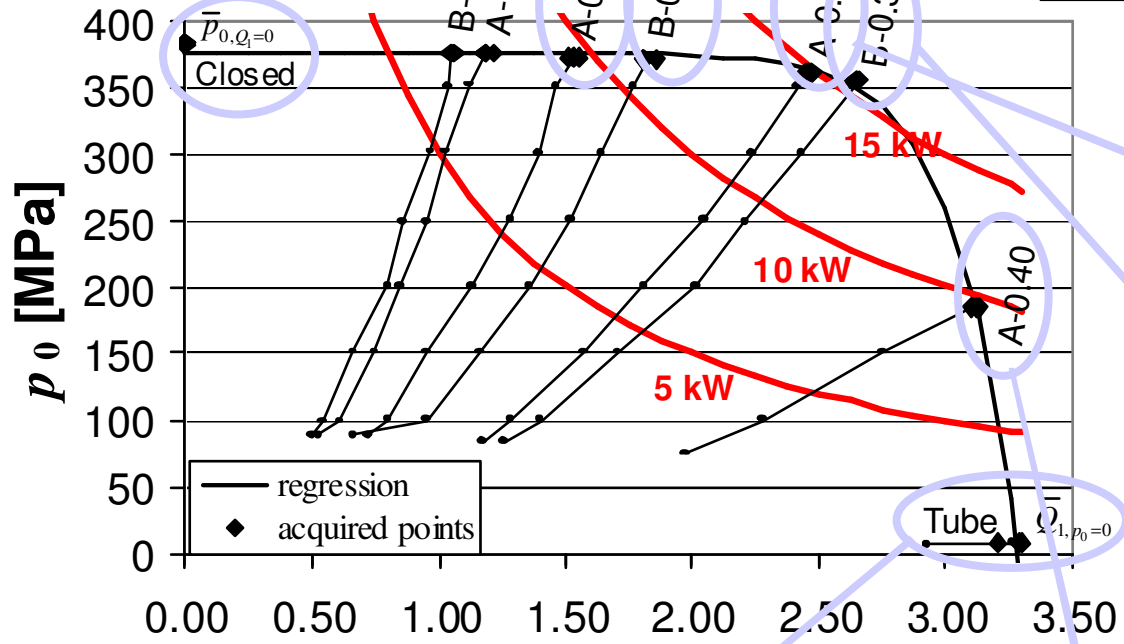
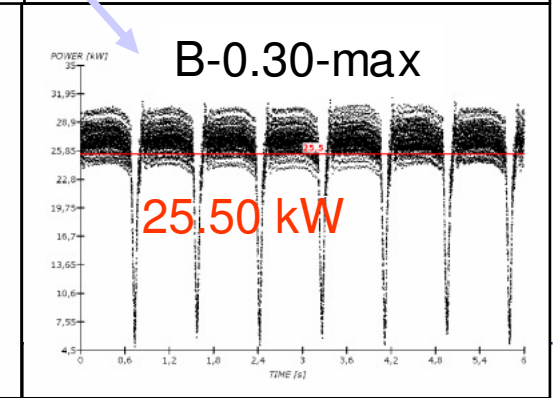
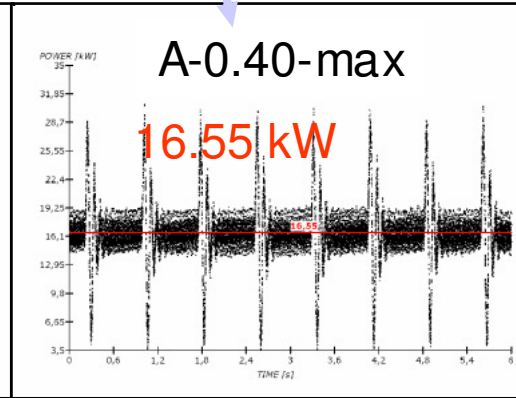
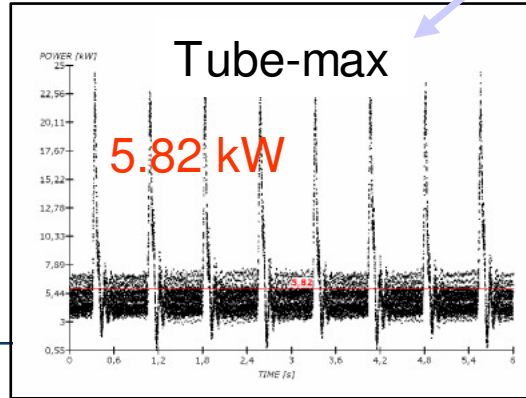
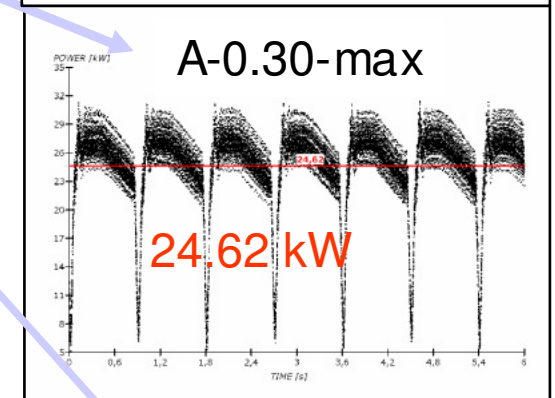
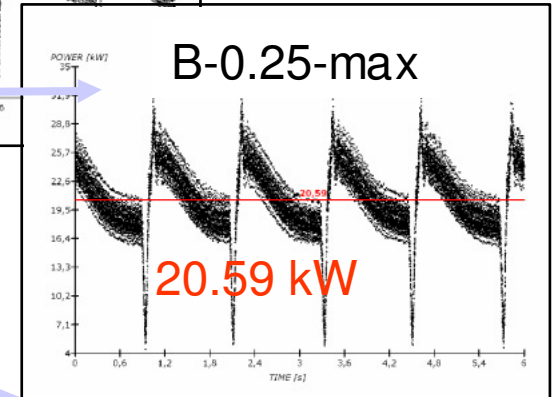
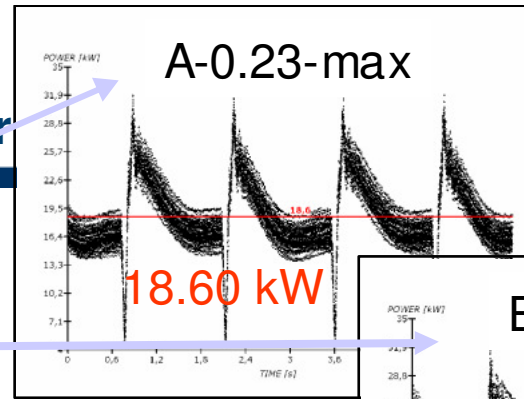
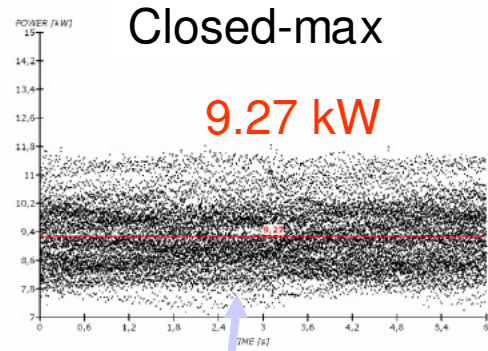


- longer pipes
- leakages

A, B	Orifice producers
D	Diamond orifices
ST, SP	Diamond orifices internal geometries

M. Annoni, L. Cristaldi, M. Lazzaroni, M. Monno, Water jet system characterization, monitoring and control based on pump motor power signal analysis, Proc. of the 18th International Conference on Water Jetting, Gdansk (Poland), 13-15 September 2006, Ed. BHR, pp. 83-96.

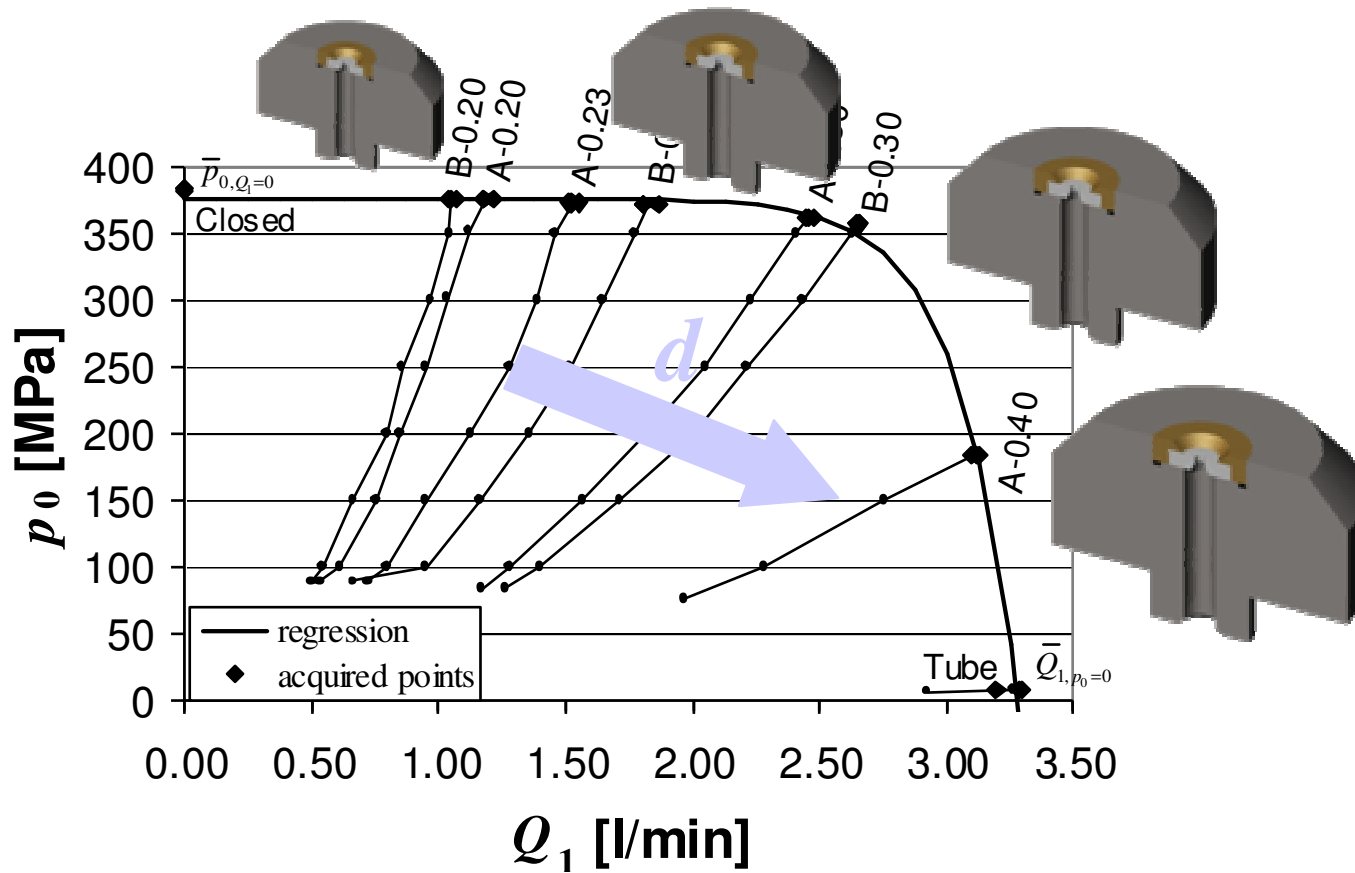
# Characterization Characteristic curve - Power





# Components characterization

## Characterization and comparison of orifices

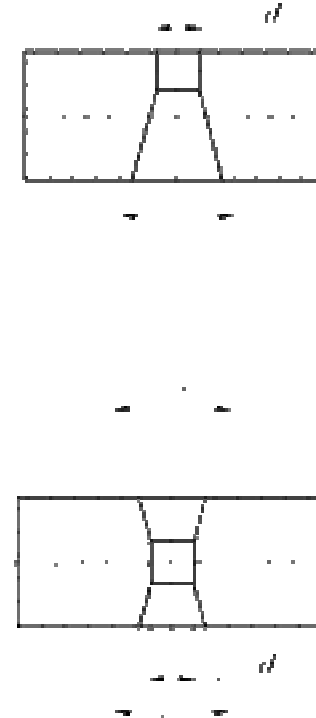
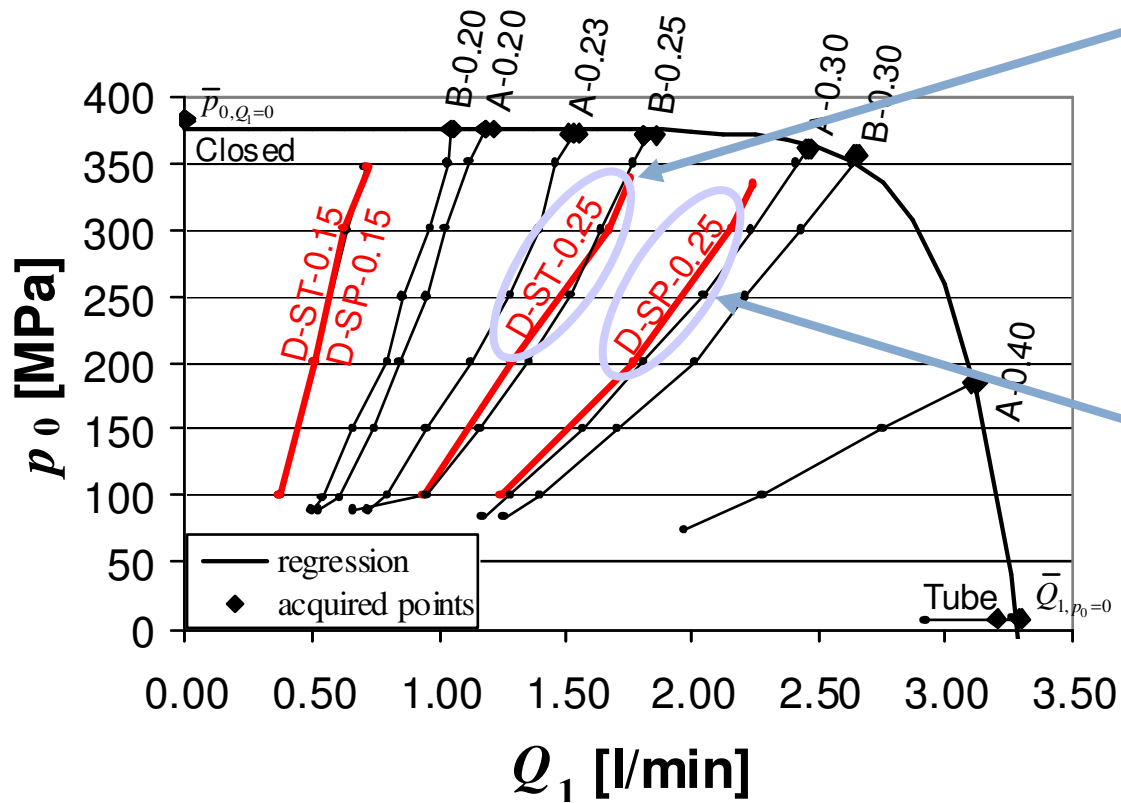


A, B	Orifice producers
D	Diamond orifices
ST, SP	Diamond orifices internal geometries



# Components characterization

## Characterization and comparison of orifices

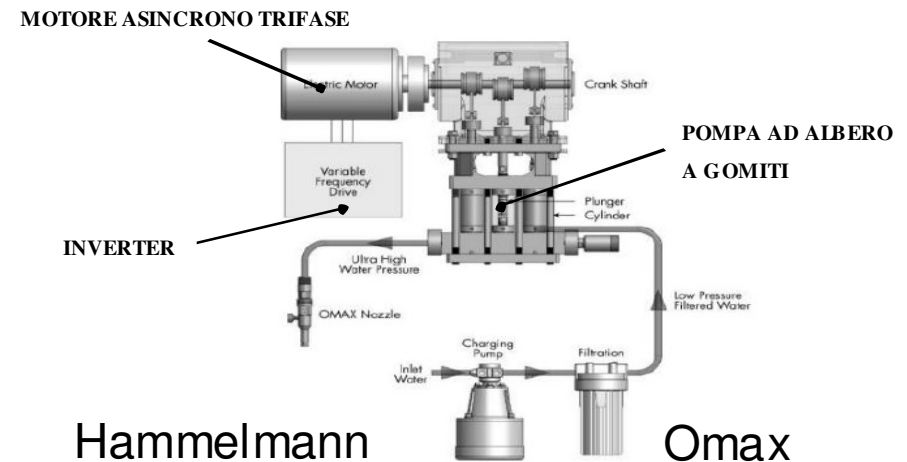
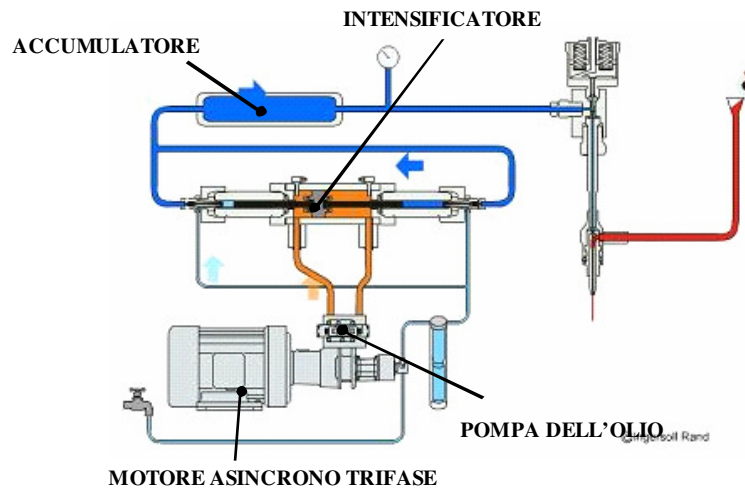
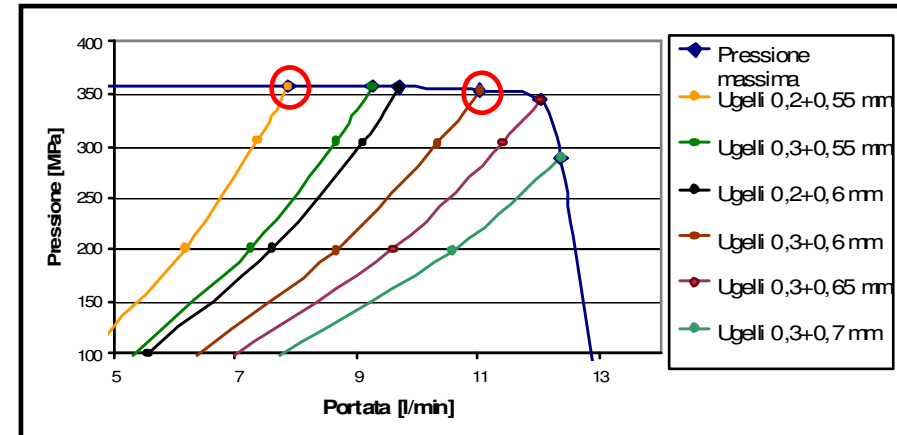
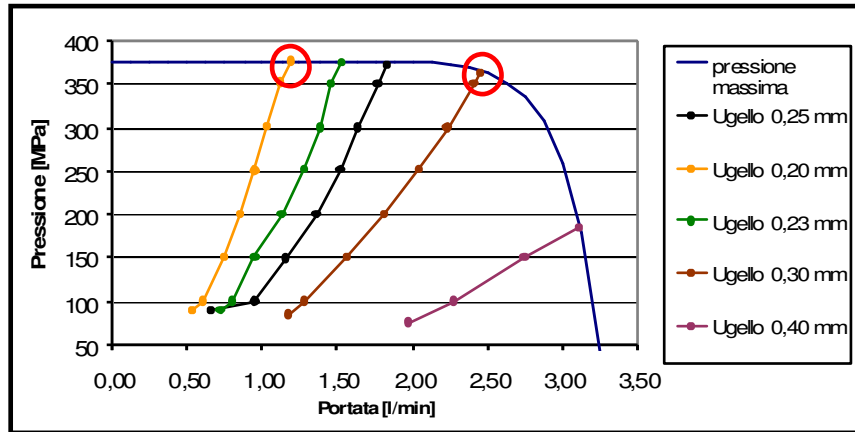


A, B	Orifice producers
D	Diamond orifices
ST, SP	Diamond orifices internal geometries



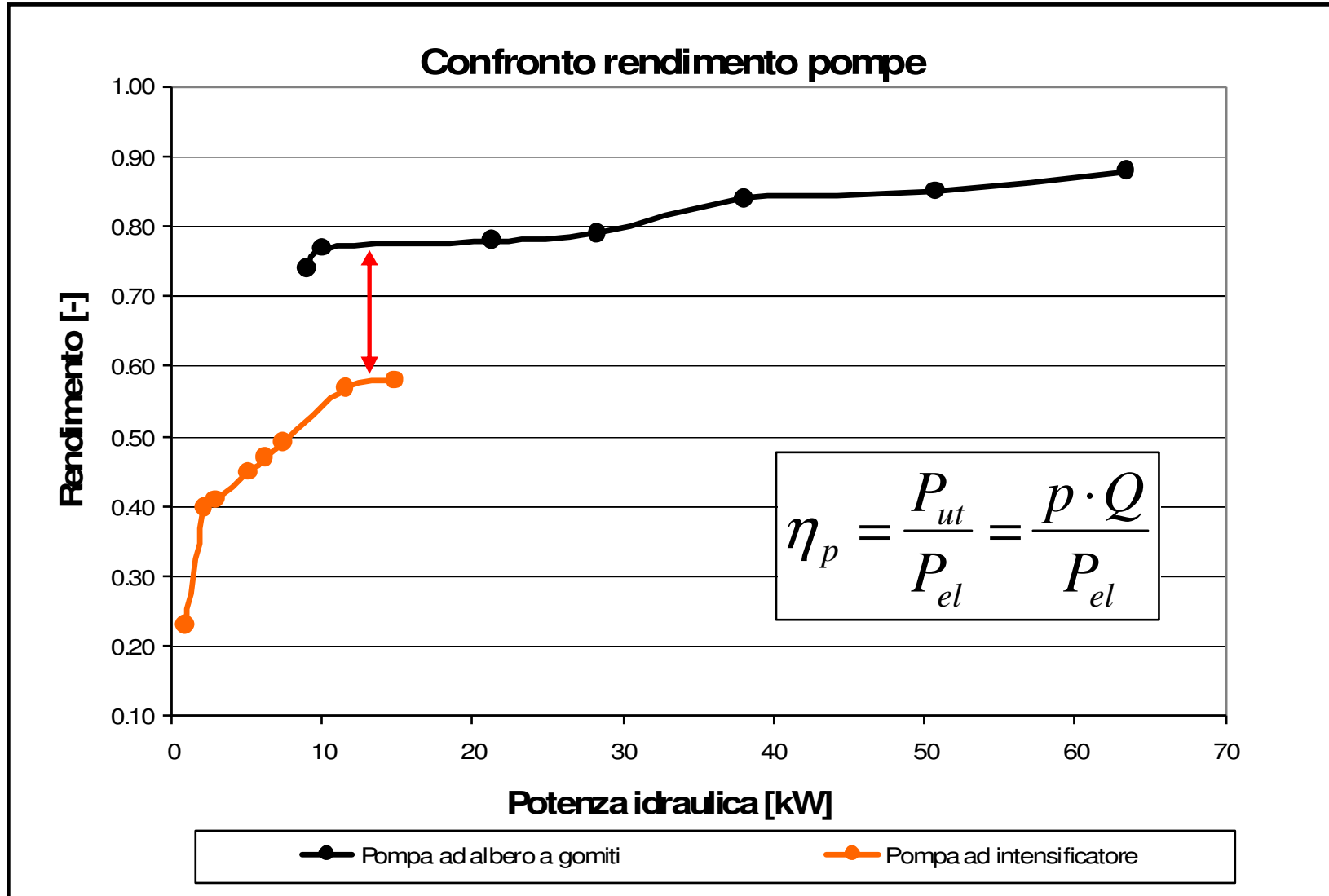


## characteristic curves comparison



Hammelman

Omax



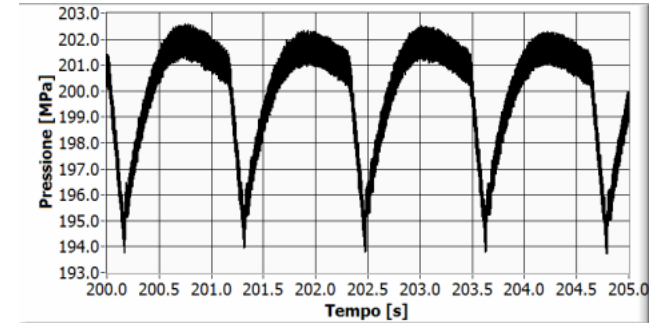
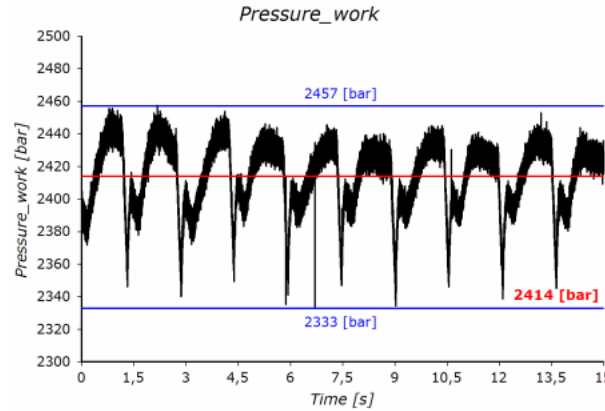
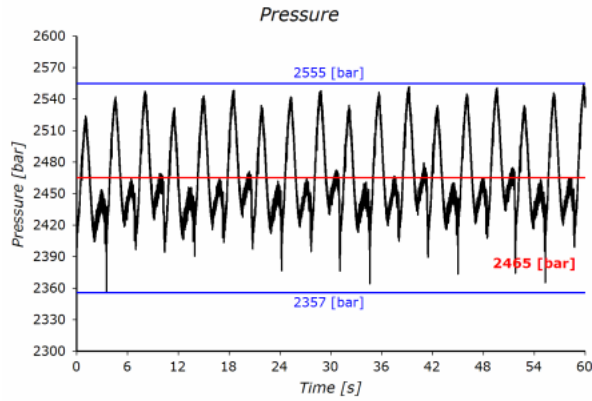
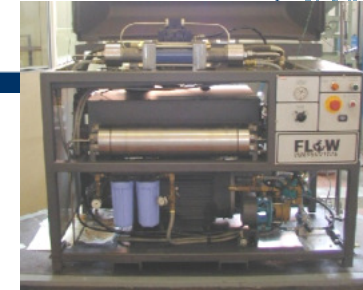


Tecnocut 60 HP

# Jet Edge X-Stream 90-50

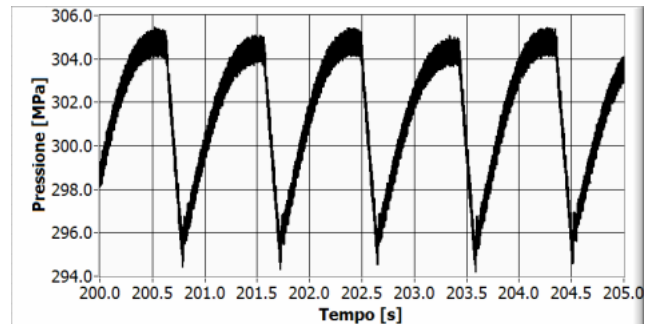
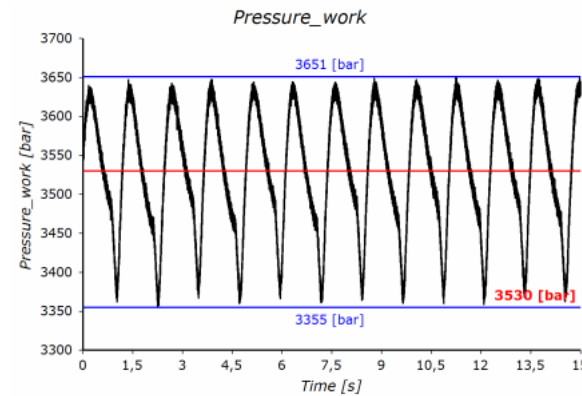
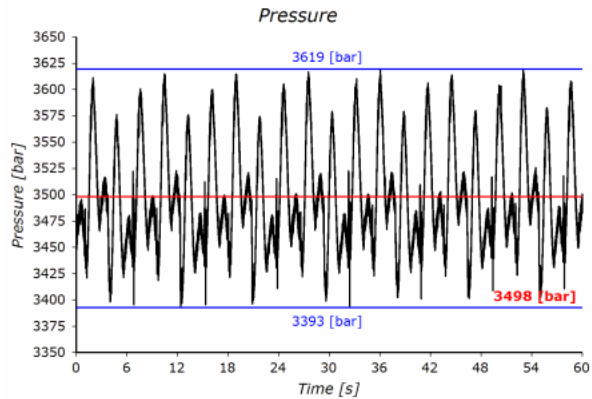


# Flow 9XV-S



0,25 mm - 250 MPa

0,30 mm - 200 MPa

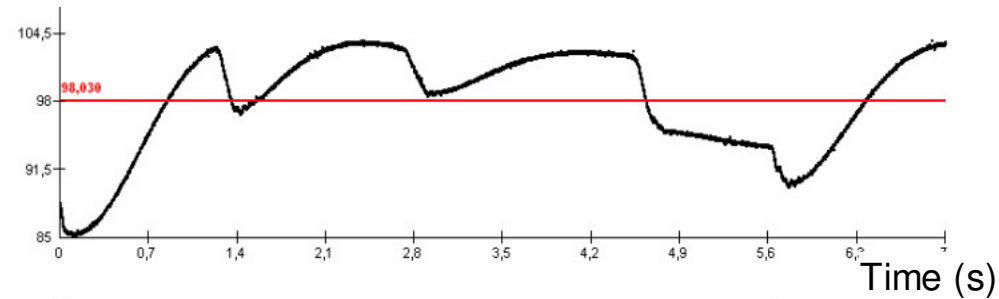


0,25 mm - 360 MPa

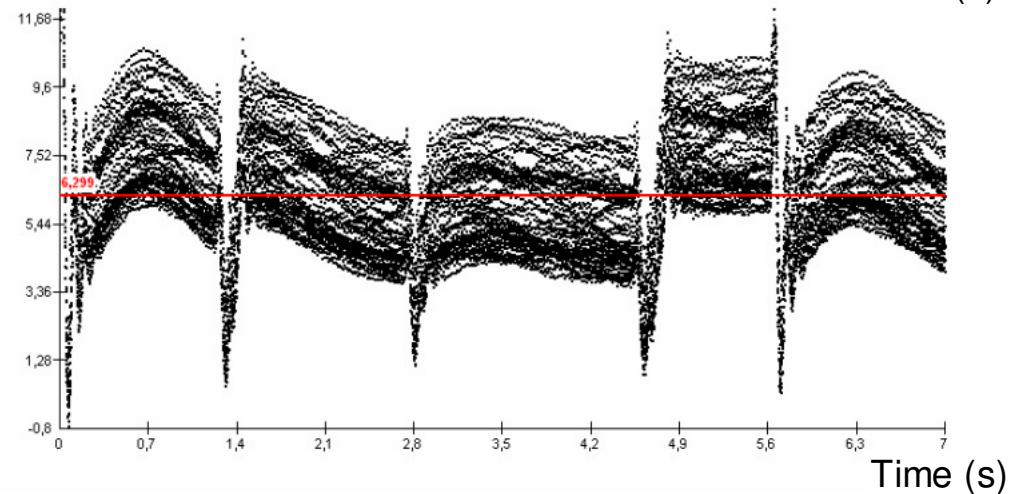
0,30 mm - 300 MPa



**Pressure  
[MPa]**



**Power  
[kVA]**



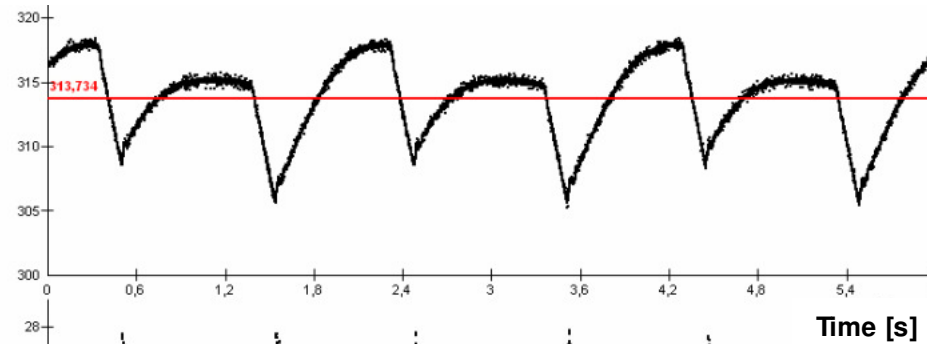
Check valve malfunctioning condition at 100 MPa

M. Annoni, L. Cristaldi, M. Lazzaroni, Measurements, Analysis, and Interpretation of the Signals From a High-Pressure Waterjet Pump, IEEE Transactions on Instrumentation and Measurement, Vol. 57, No. 1, January 2008, pp. 34-47.

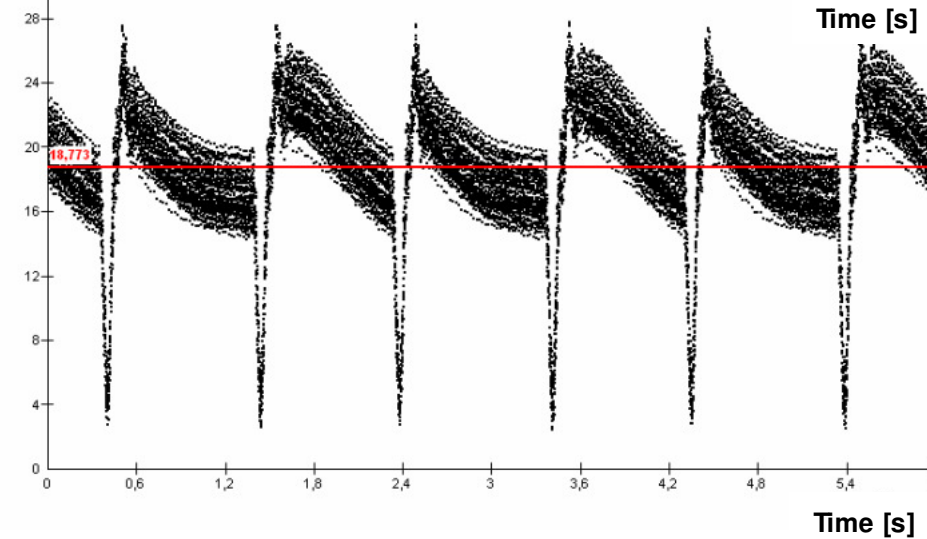
M. Annoni, L. Cristaldi, M. Lazzaroni, M. Monno, Water jet system characterization, monitoring and control based on pump motor power signal analysis, Proc. of the 18th International Conference on Water Jetting, Gdansk (Poland), 13-15 September 2006, Ed. BHR, pp. 83-96



Pressure  
[MPa]



Power  
[kVA]



Seals failure condition at 313 MPa



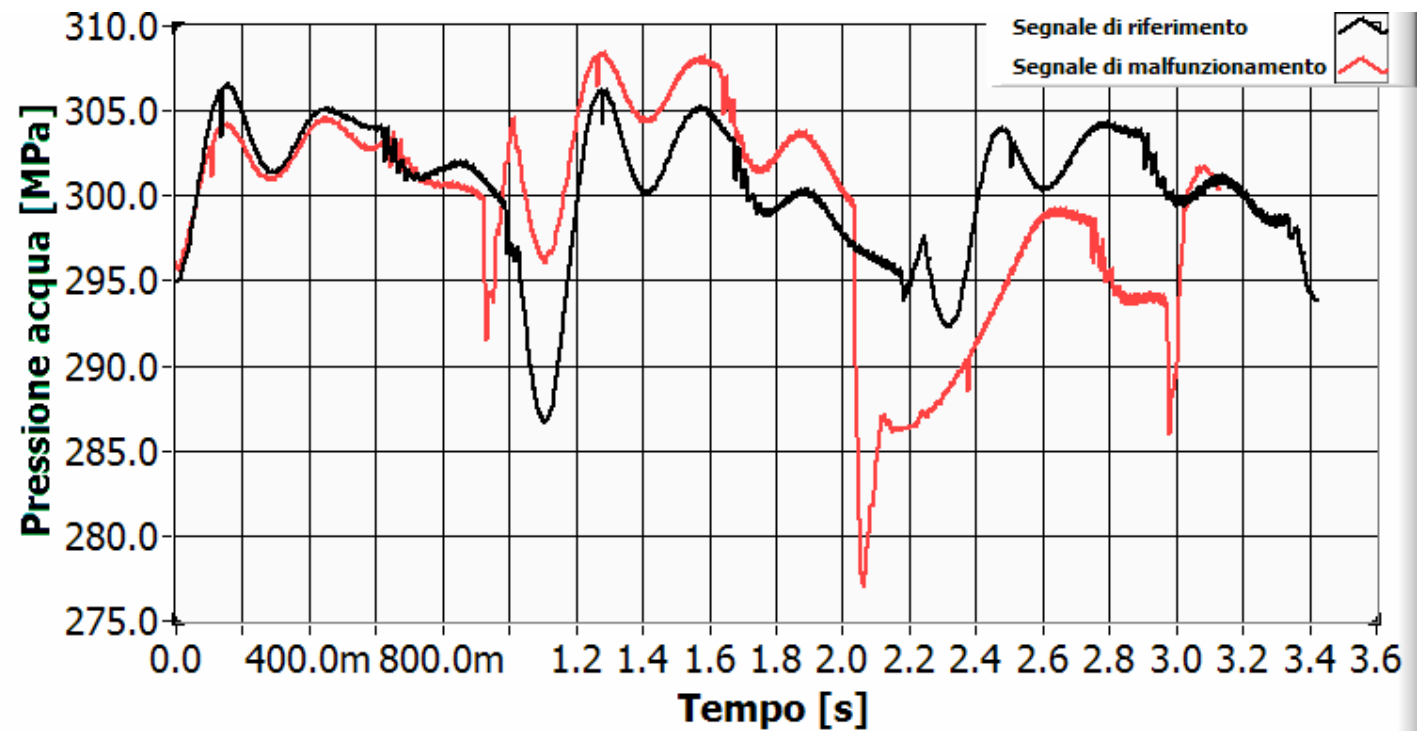
## Case 1: HP seals breakage



Tecnocut



Technology day '08  
20 November 2008  
20th November 2008  
20th November 2008  
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in collaboration with  
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invito invitation



Orifice diameter 0.4 mm – pressure 300 MPa (3000 bar)

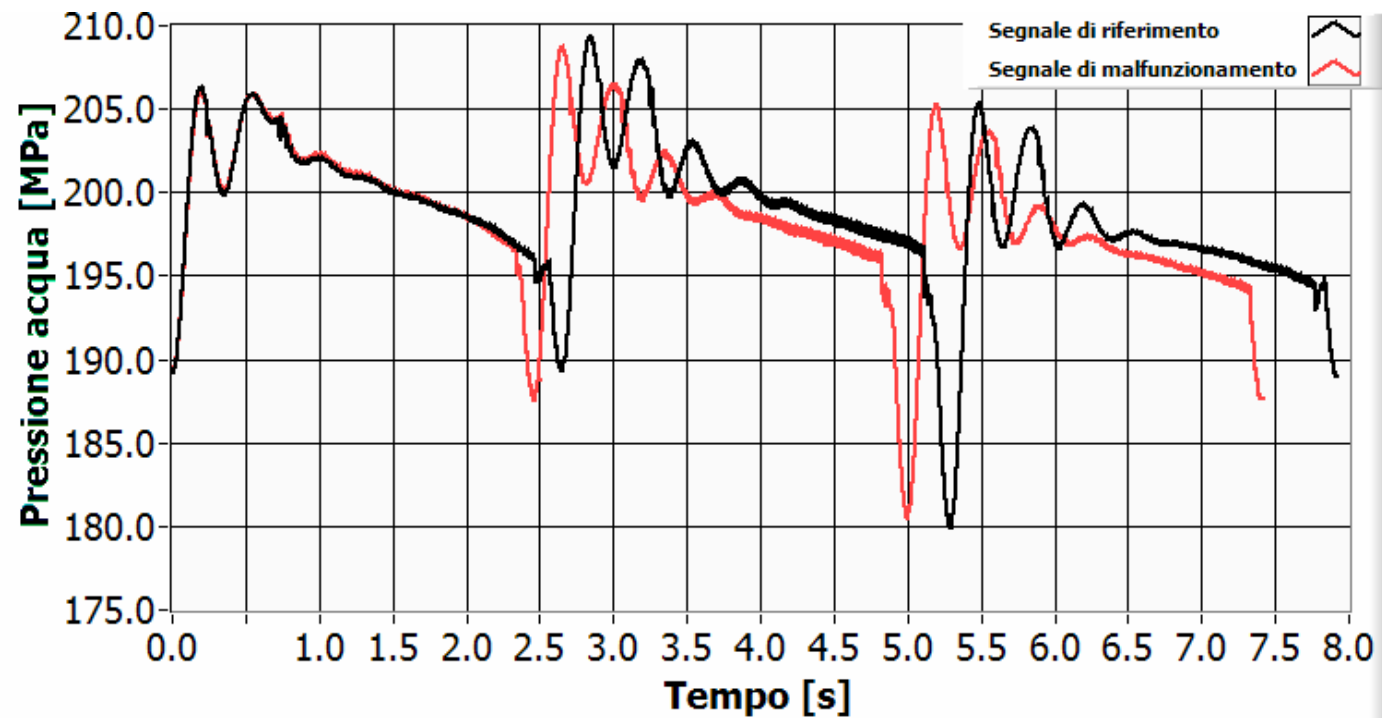
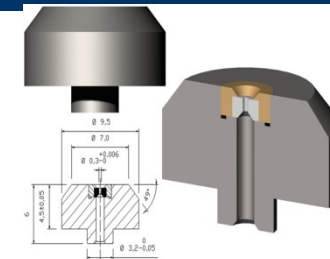


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Politecnico di Milano  
invito invitation

## Case 2: Orifice breakage



Orifice diameter 0.3 mm – pressure 200 MPa (2000 bar)

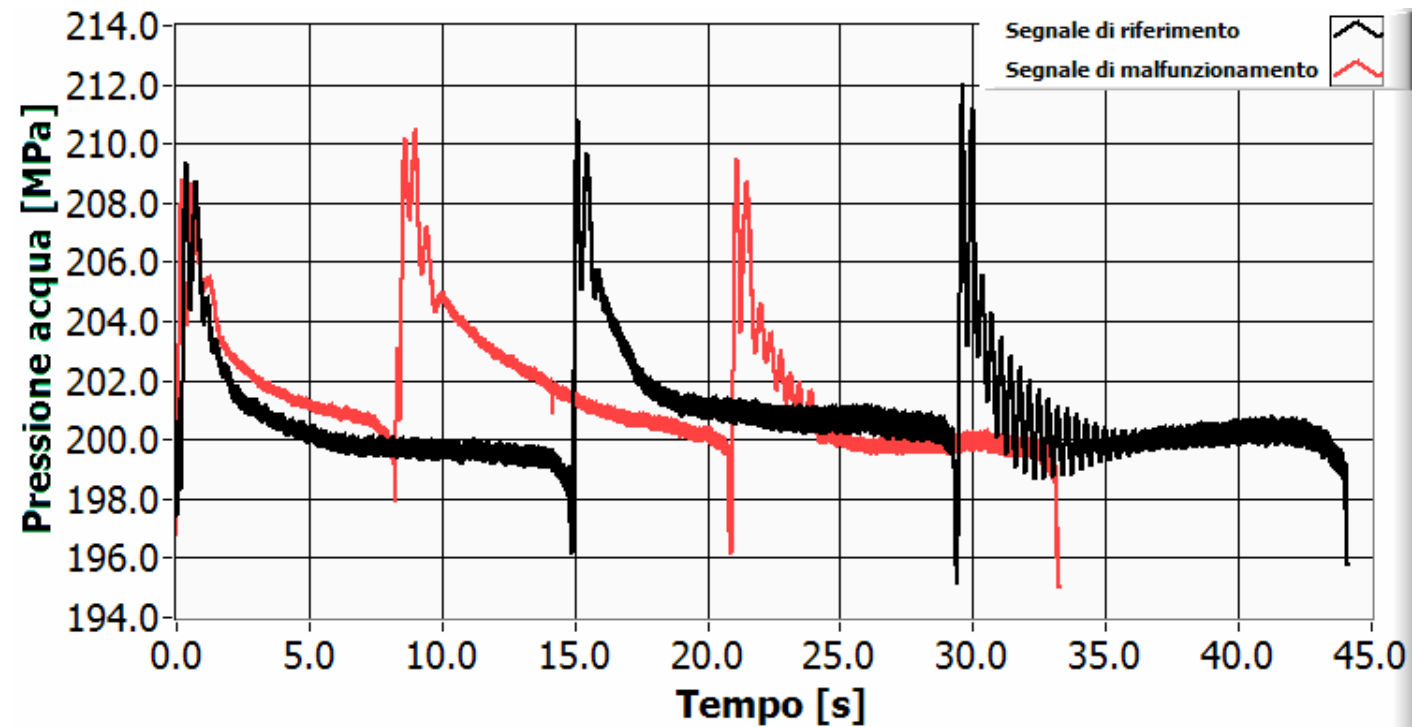
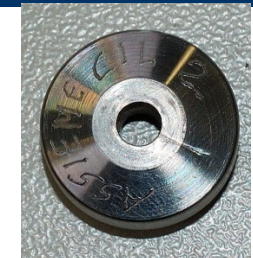


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20 November 2008  
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## Case 3: Valve seat breakage



Orifice diameter 0.3 mm – pressure 200 MPa (2000 bar)





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