**Pumpcharacteristics and pumpcontrol**

1. Pumpcharacteristic of a pump when changing the pressure, measure also the current (question F)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| P (bar) | Q1 (L/min) | Q2 | Q3 | Q(mean) | Q(st dev) |
| 0,5 |  |  |  |  |  |
| 1 |  |  |  |  |  |
| 1,5 |  |  |  |  |  |
| 2 |  |  |  |  |  |
| 2,5 |  |  |  |  |  |
| 3 |  |  |  |  |  |

B)Pumpcharacteristic of a pump when changing the flow

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Q | p1 | p2 | p3 | p gem |
| 40 |  |  |  |  |
| 35 |  |  |  |  |
| 30 |  |  |  |  |
| 25 |  |  |  |  |
| 20 |  |  |  |  |
| 15 |  |  |  |  |
| 10 |  |  |  |  |
| 5 |  |  |  |  |
| 0 |  |  |  |  |

1. Pumpcharacteristics in parallel

What is the purpose of switching two pumps in parallel?

Measure the flow when both pumps work in parallel. Do this in the three possible ways,flow over left,middle and right flow measurement. Now compare the results of the measurement with those of the calculated flow. What can you conclude? Why is this?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| P (bar) | Q1 (L/min) | Q2 | Q3 | Q(mean) | Q(st dev) |
| 0,5 |  |  |  |  |  |
| 1 |  |  |  |  |  |
| 1,5 |  |  |  |  |  |
| 2 |  |  |  |  |  |
| 2,5 |  |  |  |  |  |
| 3 |  |  |  |  |  |

1. Pumpcharacteristics in series.

If you switch two pumps in series, what do you want to do? Measure the pressure if you couple the pumps in series. Now compare the results of the measurement with those of the calculated pressure.. What do you conclude and why?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Q | p1 | p2 | p3 | p gem |
| 40 |  |  |  |  |
| 35 |  |  |  |  |
| 30 |  |  |  |  |
| 25 |  |  |  |  |
| 20 |  |  |  |  |
| 15 |  |  |  |  |
| 10 |  |  |  |  |
| 5 |  |  |  |  |
| 0 |  |  |  |  |

Make a curve (in excell) of your measurements!

1. Now draw a pumpcharacteristic if you change the rotationspeed by means of the frequencycontrol. Do this for 50Hz,45Hz and 40Hz.Use both pumps frequencycontrolled in parallel!

Compare the results with the results from the first measurements.

1. 50Hz/45Hz/40Hz

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| p | Q1 | Q2 | Q3 | Q gem |
| 0,6 |  |  |  |  |
| 0,9 |  |  |  |  |
| 1,2 |  |  |  |  |
| 1,5 |  |  |  |  |
| 1,8 |  |  |  |  |
| 2,1 |  |  |  |  |

Try to prove on your excell graph why the modern way of controlling the flow is using frequency drives.

1. Make a curve showing power in function of flow so measure current when changing flow and pressure (questions A and B!)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Pomp 1** | **P** | **I1** | **I2** | **I3** | **I(gemiddeld)** |
|  | 0,25 |  |  |  |  |
|  | 0,75 |  |  |  |  |
|  | 1,25 |  |  |  |  |
|  | 1,75 |  |  |  |  |
|  | 2,25 |  |  |  |  |
|  | 2,75 |  |  |  |  |
|  | 3,25 |  |  |  |  |
|  | 3,7 |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **pomp1** | **Q** | **I1** | **I2** | **I3** | **I(gemiddeld)** |
|  | 0 |  |  |  |  |
|  | 7,5 |  |  |  |  |
|  | 15 |  |  |  |  |
|  | 22,2 |  |  |  |  |
|  | 30 |  |  |  |  |
|  | 37,5 |  |  |  |  |
|  | 45 |  |  |  |  |

1. *Cavitation/NPSH*

*Change the opening of the suction valve. Do this in several steps and measure (if possible) vibrations. At a certain moment you can see (vibration measurement) or hear cavitation? Explain.*