Case studies

1 - Study of leaks in a pump or a compressor

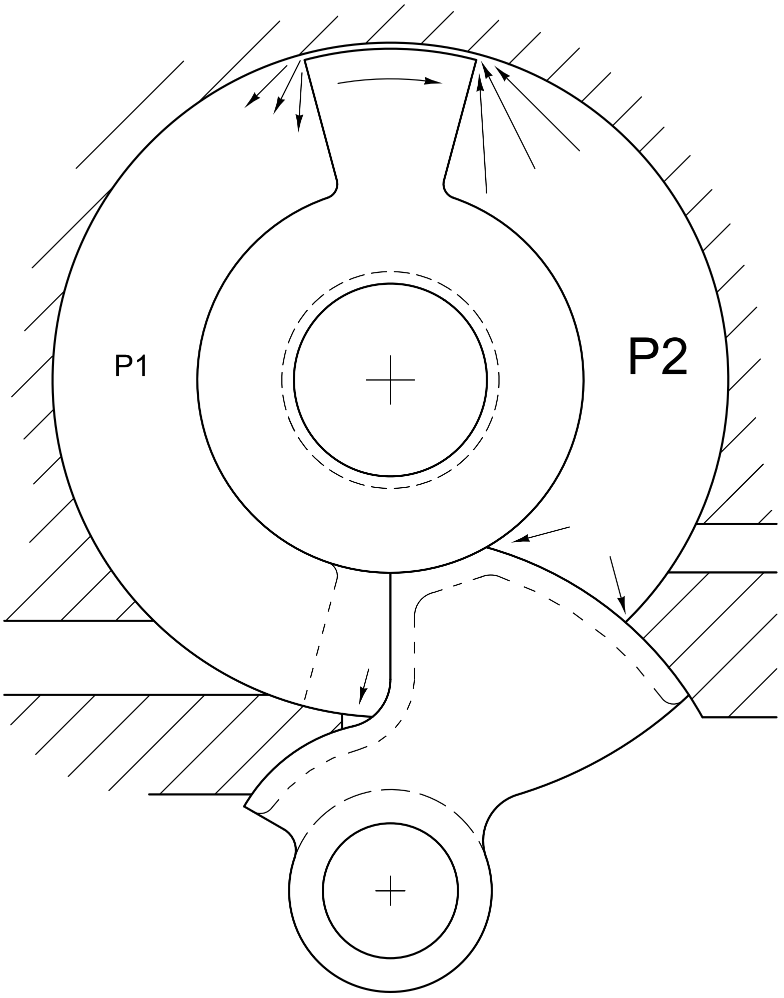

Figure 1 - Leaks in a pump or a compressor

Taking into account what was said in the “Technology” section, we can consider that:

In the case of a pump or a compressor, P1 pressure is below atmospheric pressure, thereby creating a depression. P2 pressure is greater than atmospheric pressure either because it has to overcome the internal friction of the aspirated or compressed fluid, or because the aim is to obtain pressure on this side of the blade.

Tolerated leaks will compensate for P1 depression.

Case studies

2 - Engine leaks

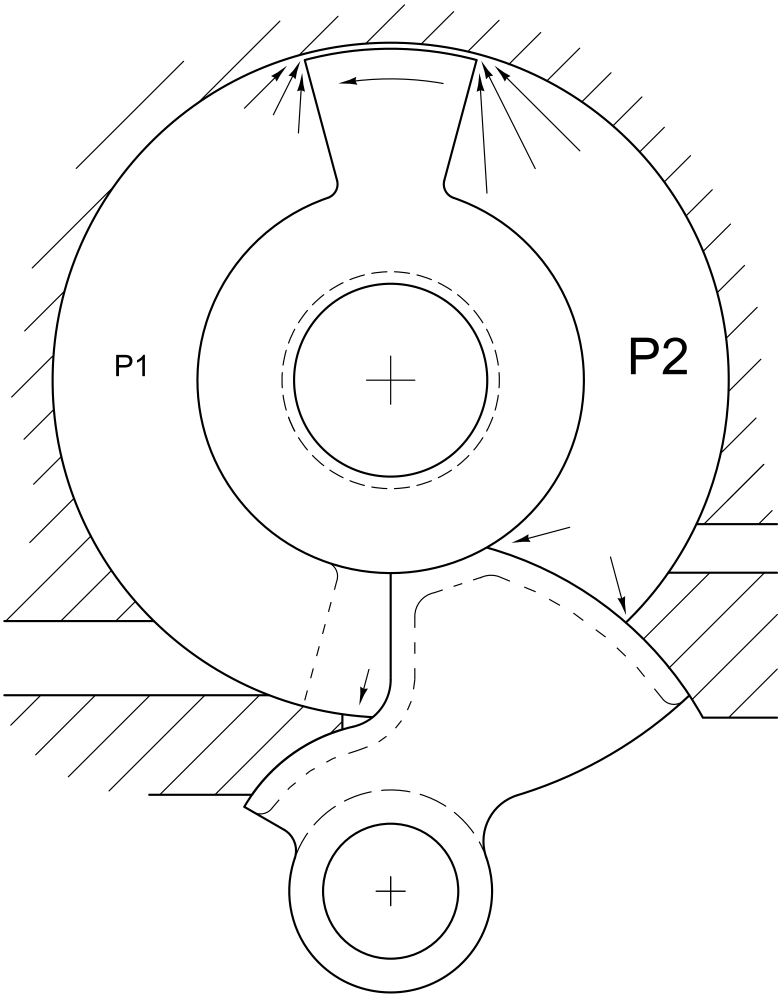

Figure 2 - Engine leaks

Taking into account what was said in the “Technology” section, we can consider that:

In a compressed-air or hydraulic engine P2 pressure is higher than atmospheric pressure because the aim is to generate engine torque. P1 pressure is greater than atmospheric pressure because it is necessary to overcome internal friction from the motive fluid generated by its back flow.

Leaks will be fully or partly balanced on both sides of the blades.

Case studies

3 - Study for a linear engine torque

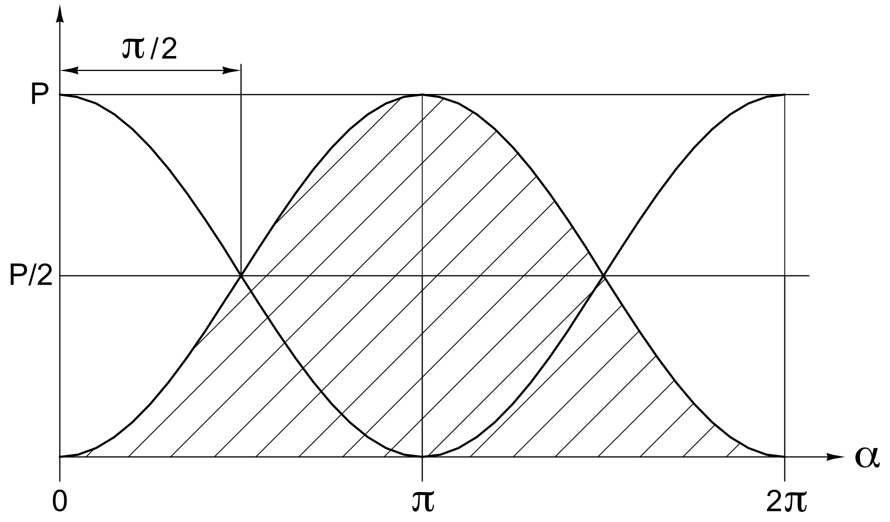

Figure 3 - Preliminary study

Figure 6.3 shows a study of how linear engine torque can be generated using two blades per rotor.

As the torque value is defined by M = F*r and F depends on P pressure,
The torque is linearized by pressure management.

Intake or back pressure valves are used for pressure management.

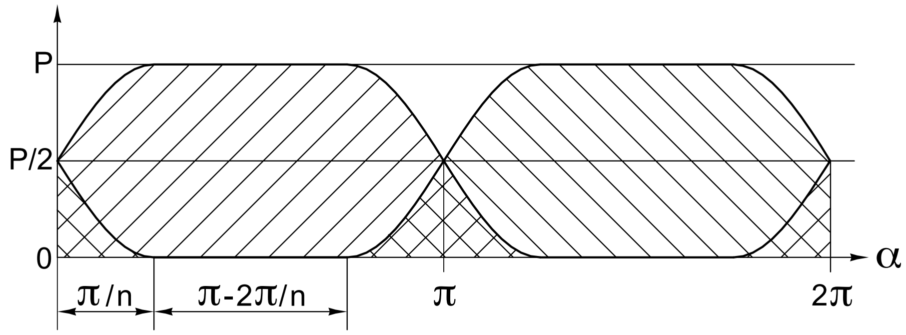

Figure 4 - Study including tilting time

In figure 4, pressure buildup time and release time are expressed by π + 2π / n, tilting time of the stops is expressed by π - 2π / n.

In this case, variable “n” is the value of the divisor.

Case studies

4 - Study of a minimum tilting angle for the stops

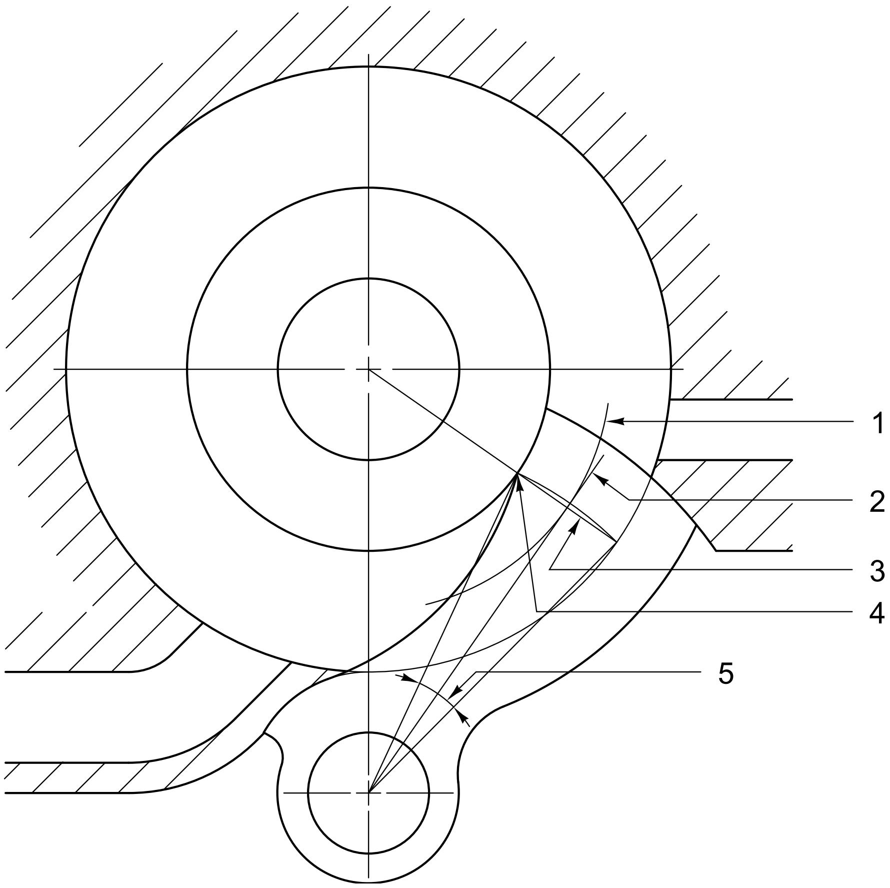

Figure 5 - Study of minimum tilting angle

Figure 5 shows a study of how the tilting angle of the oscillating stops can be limited.

This study shows the smallest tilting angle (5).

In fact, the angle of rotation (5) must be as small as possible to limit the inertial Forces.

This angle is defined by the perpendicular (3) to the tangent (2) of the primitive radius (1) of the torus forming the cubic capacity of the Turbivo.

The perpendicular (3) to the tangent (2) coincides with the radius of the torus. It passes through point (4).

Case studies

5 - Study of the compression ratio

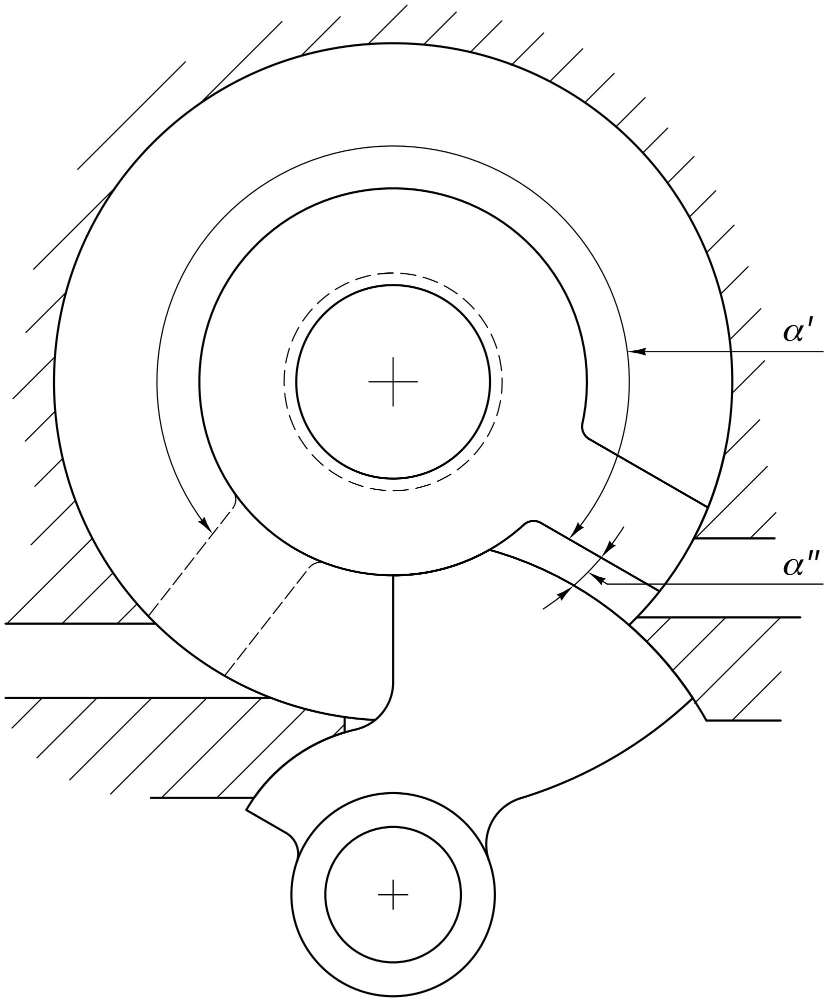

Figure 6 - Study of the compression ratio

In this study, we can consider that the compression ratio is equal to:

$$\rho=(\alpha'+\alpha'')/\alpha''$$

Where ρ is the compression ratio,
α' is the maximum effective capacity and
α'' is the dead space.

The unusable volume between the torus and the shutoff valve must be added to the dead space.

The above suggests that the shape of the turbine provides engine braking.