# Centrifugal Compressor – Production Manager Standing Order : Increase Gas Rate Immediately to Get More Money!!

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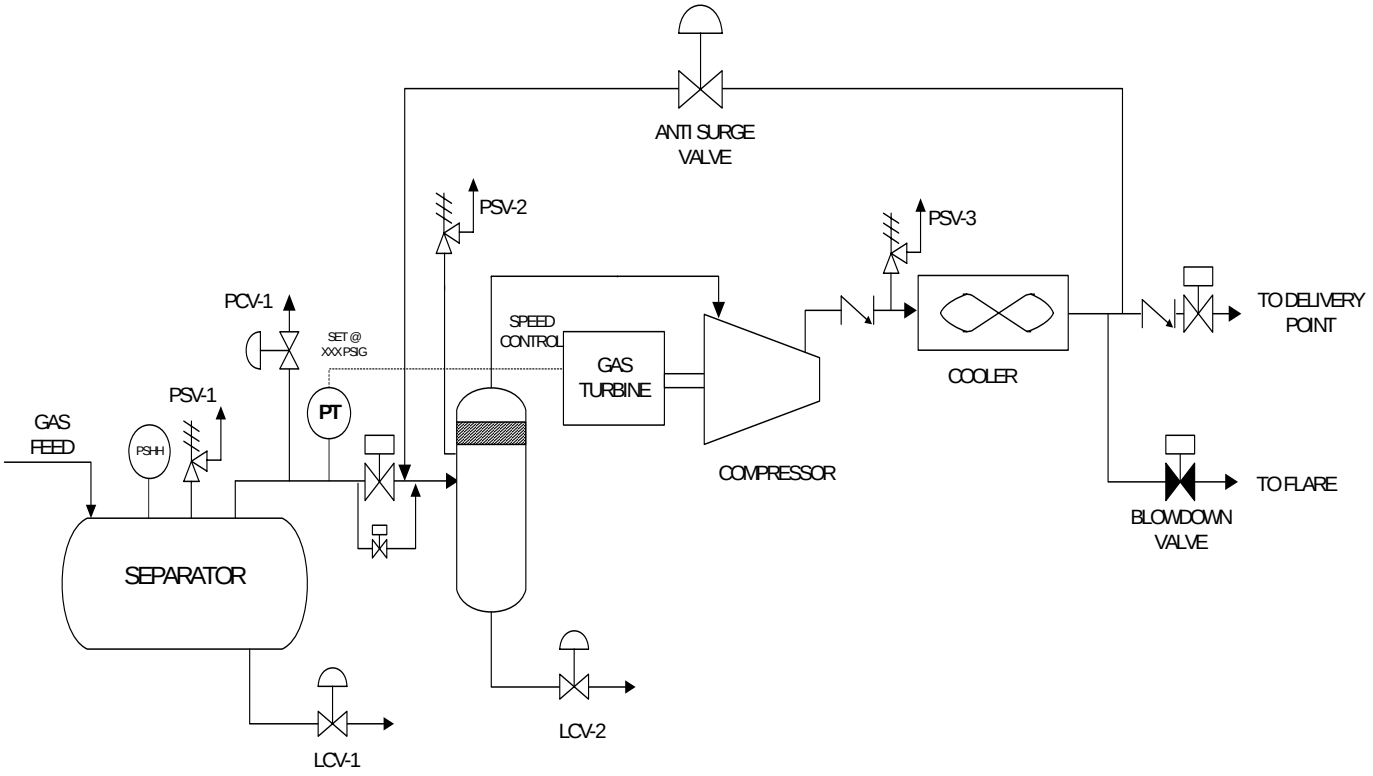
While a company facing a challenge to produce more gas, operation is requested to increase gas rate with the existing facilities. The first common question is: Can our centrifugal compressor deliver more gas than current operation?

Do not rush to answer that question! We must do carefully verify what effect if we have to increase compressor rate. Suppose gas wells are still strong enough to against current setting of suction compressor. So, the simple thing to increase the capacity of the compressor is raise up the suction pressure of the compressor. The first step is, we have to review the present power available of the compressor. Do we still have power spare to compress more gas? If yes, second question may be: How far current operation close to T5 of turbine? Sometimes even though power is still available, T5 is close with shutdown setting limit. It means you must do something, detergent wash the turbine is a common solution.

Figure above represents a common configuration of centrifugal compressor installation.




Increasing the setting pressure of suction side does increasing suction pressure of the compressor. According to the gas rule's, by increasing the pressure, actual volume of the gas decreases, means the compressor will compress more actual volume of gases. Refer to the compressor equation, increasing suction pressure, which is one of denominators of the equation, causes less power requirement for the same rate at lower suction pressure, or for the same power input to the compressor, the gas compressed increase. If power input to compressor increased again, more gas compressed.

Increasing setting point on PT automatically will decrease compressor speed so rate decreases. So how increasing the suction pressure can increase the gas rate? If the condition happened, it means the gas flow to the compressor is not enough! Remember that gas rates from wells are still slightly reduced because we increase "the resistance" at suction compressor. The only way to increase the speed is, increase the gas rate. This is the time to more open choke valve or possibly, open stand-by wells. This is our manager want!

In papers, it seems good, but there are still some considerations to be aware. Increasing PT setting should be communicated to entire system

of centrifugal compressor. The centrifugal compressor systems are not just compressor and driver, but also cover suction scrubber, and inlet separator, and off course, process/safety instrumentation (e.g.: PCV, LCV, PSV, etc). Let's explore more deeply.

Increasing the setting point sometime gives the new number too close with the PCV flare (PCV-1). If it is, so increase the setting of PCV. Okay, but how if the new setting of the PCV is too close with PSHH setting. Then we increase the setting of the PSHH. How if the new setting of PSHH also is too close with PSV of inlet separator (PSV-1)? Then we increase the setting. Wait the minute! We touch safety issue here. We can't set the PSV higher than 1.1 of MAWP's separator as per API RP-520, except the PSV is fire-based. (Figure before showed PSV-1 sized based on block discharge case). Sometimes, even though the PSV's new setting still acceptable, we may have to buy a new spring for the PSV. Be prepared…

Let's decide on that case, our PSV setting is far enough from PSHH so still acceptable. What we should worries now? I think is settling out pressure of the compressor. What is that? It is the equilibrium pressure when compressor shutdown and anti-surge valve open. The equilibrium pressure value is between suction and discharge pressure of the compressor. By increasing the suction pressure, settling out pressure increases. What we should worry? Your setting pressure of PSV-2, located on suction side of compressor. Normally, this PSV is fire-based and set at value, which is still far enough from settling out pressure. If you forgot to review this PSV, it could cause a problem by frequently popping up during compressor shutdown.

All have been reviewed completely? I think yes, except if your systems have special features that need more consideration.

Can I increase the gas rate by reducing the setting of suction pressure of compressor? Off course. Do we need to consider another system that may impact due to lowering the suction pressure? Off course. All details will be explained someday.