COMPRESSOR RATINGS VS REALITY IN AUSTRALIA

By Ian Speer

Another year and the prospects for our industry look good with commodity prices up and an ongoing drought to keep up the demand for water bores.

After a run of booster articles it seems timely to start the year with a short article about the effects of compressor deration due to both ambient conditions as well as internal wear issues.

For most owners of high-pressure compressors, these items represent a considerable investment which they will keep and use for a long time. So what are the important points to consider when making the important choice?

- What sort of tools will you be using the compressed air to operate?
- What is the rated air consumption of these tools?
- How much more air do these tools require to operate effectively as they wear and approach the end of their life?
- Will you be using a booster?
- What will be the highest temperature that you will experience when drilling?
- What will be the highest altitude at which you will normally operate?
- How much loss of output will the compressor you select loose over its normal service life prior to rebuild or replacement of internal components?
- What is the rated maximum temperature that the compressor/rig is designed to operate in?
- What fouling factor is incorporated into the compressor's cooling system?

With the answers to all of these questions you will be sure to select a compressor that will serve you well with a minimum of drama on the hottest of days. It is quite common to see compressors or for that matter drill rigs selected on the basis of the simple requirement for compressed air as shown on the hammer manufacturer's brochure and the capacity of the compressor at "standard" conditions.

The net result can be very unhappy drillers and owners as their tools do not work well and the rig/compressors sometimes overheat due to inadequate cooling system capacity.

We will use a couple of simple examples.

First a blast hole rig drilling with a 6 inch hammer. The hammer in this example is a well-known Australian product the PB6 Premier and the driller is working at a mine in the North Eastern Goldfields in WA.

- Rated compressed air consumption from the PB6 brochure 840 scfm at 350 psig.
- Allow say 7% for wear over the life of the hammer or about 60 scfm.
- No booster in this case
- In-pit conditions 55ºc.
- Altitude approx 1000 feet above MSL
- Based on extensive testing, 5% loss of capacity is common at 10000h. It is important to note that most compressor makers rate their units within +/- 3% of their stated capacity. In practice after testing a lot of new compressors the reputable brands all produce a little more than the rated output.

With this information and using a commonly available deration table as published by International Drill Quip the effective output of the compressor will be reduced by 18% on the hottest days (equivalent to an altitude of a little over 5000 feet).

Now taking the worst case situation of a worn hammer, a worn compressor and the hottest day the results are as follows.

- Hammer air consumption is 840 + 60 = 900 scfm/350 psig
- The compressor will be down 18% + 5% or a total of 23% which means that the compressor needs to start off with 23% more than the maximum hammer air consumption.
- 900 x 1.23 = 1107 scfm. Please note that there is NO allowance for air leaks here and if you plan to have air leaks please add on some more capacity!

The second example is a water driller in mid-NSW.

On a hot day but with a different altitude and drilling with a Halco Dominator 600, our contractor wants to be able to drill at 350 psig and is wondering how big an auxiliary compressor he needs to use alongside his rig which has a 750/350 compressor.

- Rated air consumption from the Halco brochure 1050 scfm at 350 psig.
- Allow 7% for a worn hammer, about 75 scfm
- No booster in this case
- Site temperature 40ºc
- Altitude about 3000 feet above MSL.
- Allow 2% loss assuming that both compressors are reasonably good.

Using the same deration table we learn that the compressor output will be reduced by 22% on the hottest days.

Now assuming the hammer is well worn we get 1050 + 75 = 1125 scfm/350 psig

The compressor will be 22% + 2% = 24% down we therefore require a total of 1125 x 1.24 = 1395 scfm/350 psig to get the job done well. Again there are no air leaks on this rig. The result the drill will need an extra 645/350 or in round terms he can hire another 750/350 and the job will go well.

Next we will look at an RC exploration drill in the Tanami.

They have a new Drill Quip TRC545 hammer, a 4 1/2 inch rodline, a small 636-41B 700 Hurricane booster rated at 1400 scfm at 350 psig inlet conditions and maximum discharge

pressure of 700 psig and want to drill to 250 m.

Please note if you want to go all the way back to selecting the correct booster for a particular hole this has been covered in other articles and if you want a copy please contact the writer.

The rated air consumption for the TRC545 is 950 scfm/500psig and given the hole depth, the system will easily achieve 700 psig as it approaches the bottom. The TRC545 will pass about 1450 scfm at 700 psig, so there is no flow restriction there.

We thus need a full 1400 scfm at 350 psig to ensure the booster can do its job properly.

- Altitude is 2500 feet above MSL and temperature is 50ºc resulting in a deration of 24% for the compressors.
- Assume that the compressors are well worn, allow 4% loss there for a total of 28% loss.
- Total air required is 1400 x 1.28 = 1792 scfm/350 psig.

Note the booster capacity is not significantly affected by the temperature and altitude as long as they do not degrade the drive engine performance.

As you can see there is a huge difference between the perfect world of new hammers and compressors on cool days and where many holes have to be drilled with worn equipment.

The last two items being the operating temperature rating and fouling factor are very important the first tells you if the compressor is suitable for your job in the first place. A unit rated at 45ºc or 48ºc will be no good in 55ºc temperatures and remember that the compressor can be near other hot items as well.

Fouling factor refers to the “reserve” cooling capacity of the compressors cooling system and good systems have 10% fouling factors to allow for the build up of dust that occurs during operations between the regular cleaning. As an industry we need to ask for these figures when shopping for new plant to ensure that what we buy is really suitable for the purpose intended.

I should finish by saying that all of the data in relation to hammers is publicly available and the deration table is included in an excellent drilling guide published by IDQ some time ago but they may still have copies available.

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