Hose & Coupling Interface

Just because you have a 3,000 psi hose and a 3,000 psi coupling doesn't mean you have a 3,000 psi hose assembly. One of the most important factors in hose performance is often times over looked, the **hose/coupling interface**. The Hose/Coupling interface is the science of controlling how the coupling is connected to the hose and the study of their interaction. Unless you have a hose and coupling designed specifically for each other, you may end up with a hose assembly with a lower pressure rating, reduced life, or even worse, a catastrophic failure.

There are many factors that affect the hose/coupling interface including stem design, ferrule design, hose reinforcement, hose tube material and two of the most important factors, the outside diameter of the hose - hose OD and the outside diameter of a crimped coupling – Crimp OD. As with almost everything in life, all these factors are variable. **Hose OD** variance can be reduced through high quality manufacturing processes, however, regardless of any strict manufacturing tolerances, some variation will still occur. **Crimp OD** will also show deviation from an exact dimension simply due to the variation (albeit minimal) in coupling and ferrule manufacturing tolerances, crimper performance, and other external factors**.**

Additionally, **Hose Impulse Life** (or performance) is variable. Impulse life is a function of the quality of the components that make up a hose assembly and the resulting hose/coupling interface. Figure 1 shows what three very important normal distribution curves (hose impulse life, hose OD and crimp OD) would look like.

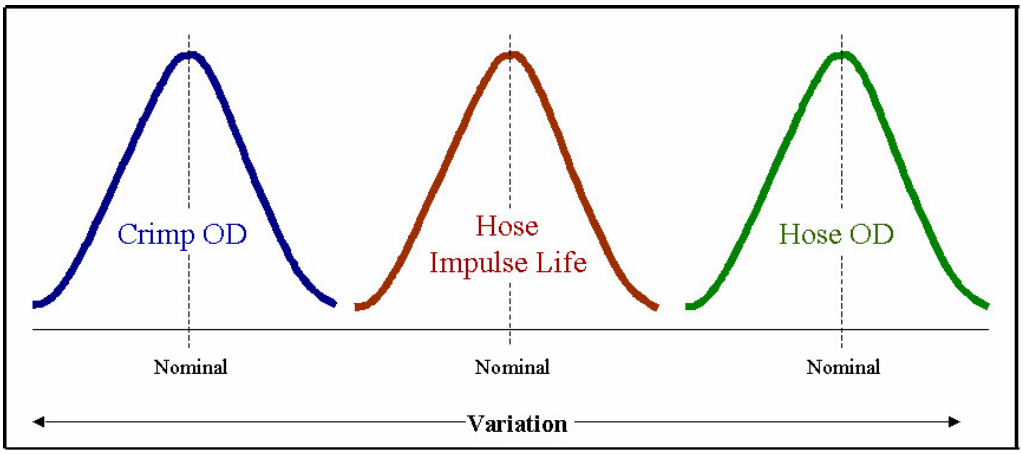

Figure 1 - Impulse Life and Hose/Coupling Interface Factors

Maximum impulse life is only achieved when variation is accounted for in:

1. The design of the hose-coupling interface
2. The manufacturing control of all of the components of an assembly
3. The validation of this system through stringent test requirements.

This is exactly what Gates does. Each factor affecting hose/coupling interface is taken into account during hose design & manufacture and continual validation is performed to ensure that hose, couplings and ferrule will together make a high performance, risk-free hydraulic hose assembly. An easy visualization of this can be seen if Figure 2.

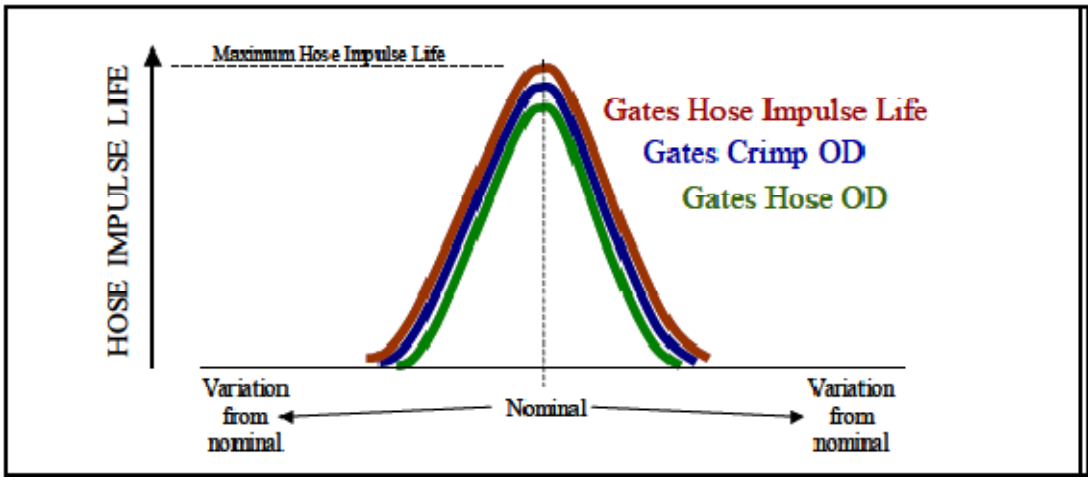

Figure 2 - Maximum performance achieved through validated compatibility

So you ask, "What if the hose and couplings are not designed for each other? What if the sources of variation in hose/coupling interface are not accounted for in design and testing?" "What if different companies make different components of the hose assembly?"

The answer? Hose performance can be drastically reduced even to the point of catastrophic failures. This can easily be visualized by the normal curves we have now become very familiar with. Let's look at Figure 3 and see what might happen if you use hose and couplings that have not been designed for each other.

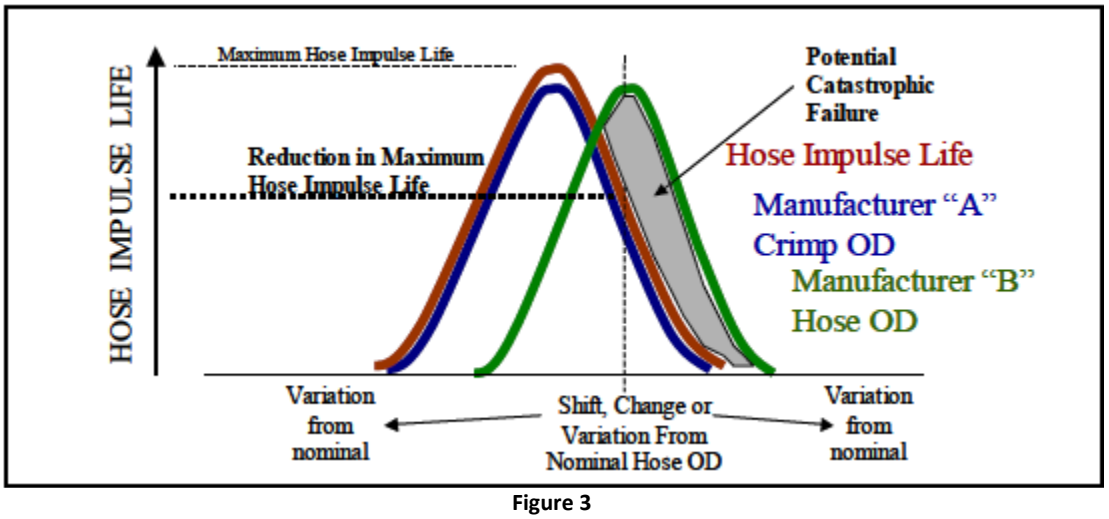

Figure 3

You can see from Figure 3 that even in the best-case scenario, you have significantly reduced impulse performance as compared to a Gates hose assembly that is designed as a system and validated through a rigorous test regiment. As Figure 4 shows, things get even worse when you take a look at all the variables.

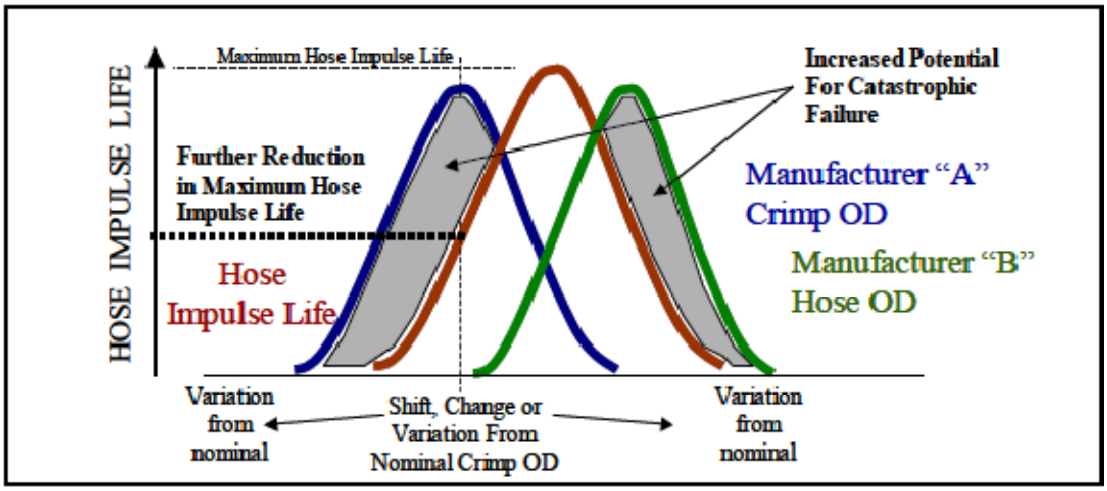

Figure 4

As variation increases even slightly for each component, a significant reduction in hose assembly life is guaranteed, and the risk for catastrophic failure increases.

The next time you grab any hose and a coupling ask yourself:
"Who is the manufacturer of these components?"
"Have these components been designed together? Validated together? And if not, what are the risks that I am assuming?"
"Am I willing to accept an assembly with a guarantee for reduced impulse life and reduced performance?"
"Am I willing to risk a catastrophic failure?"

If the hose, couplings, ferrules and crimp tolerances have been designed for each other and have passed the exacting standards of the Gates Rubber Company, these questions need not be asked. If not, you might be asking these questions and worse, you will be asking for trouble.