

# THE BASIC ENGINEERING APPROACH TO CHANGING THE PERFORMANCE OF YOUR COMPRESSOR

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It all starts with the simple principle that the only thing the compressor knows is flow (CFM) and Head. Therefore, the first thing we do is determine if the new conditions require more or less flow or more or less head. Next, we look to see if the new conditions can be achieved in the present machine.

When looking at the impacts of flow changes, we consider the following areas:

- Impeller flow coefficients (Are they within the range for centrifugal compressors)
- Nozzle velocities
- Axial stage spacing of the impellers
- MACH number effects

When looking at the impacts of head changes, we consider the following areas:

- Can the speed of the compressor be changed?
- Can the impeller diameters be changed?
- If impellers diameters are changed, what is the effect on the diffusers?

At this point, we are ready to make a stage-by-stage performance model of the compressor. This model is compared to the performance curves of the existing compressor and modified to get a reasonable match with the existing machine. The individual stage performance data can then be moved around within the compressor to see if any of the existing stages can

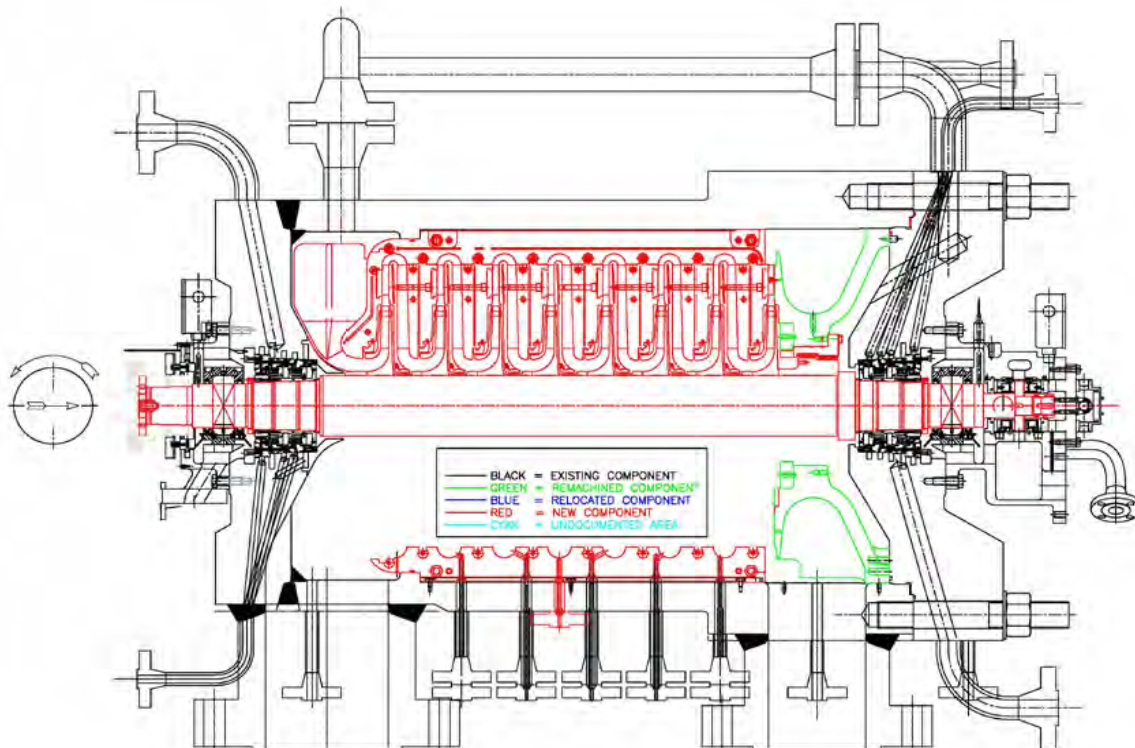


Figure 1

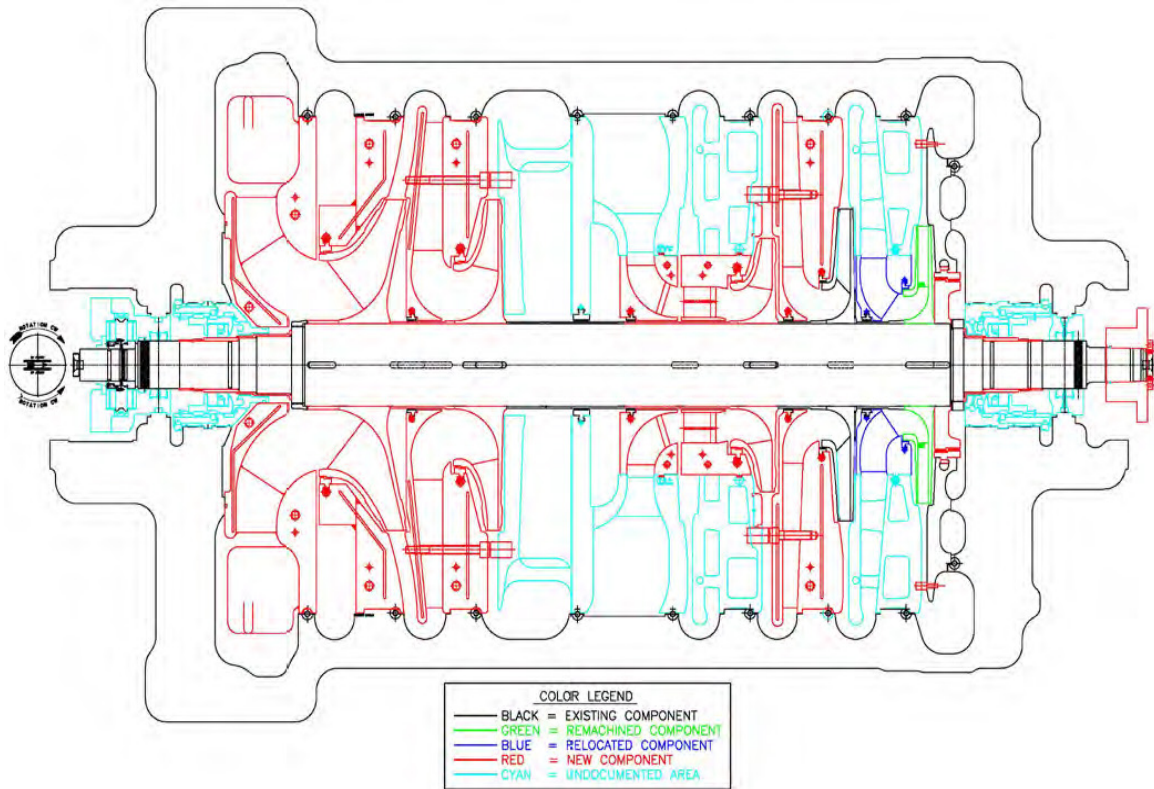


Figure 2

be used. This will significantly reduce the cost of any subsequent compressor rerate.

Once we are able to devise a solution that will accomplish the desired performance, we can do our final checks on stage spacing, performance compromises and required engineering analysis as-well-as choose the appropriate materials for the rerate.

If any of the flow considerations are outside of normal ranges, there may be adjustments needed to the stage

performance in one or both of the below parameters:

- Pressure losses
- Efficiency reduction

Once adjustments are made we can calculate a new speed and HP for the compressor, we look at the driver and train components such as couplings. Consideration is made on the impact on the lube and or seal systems. A detailed plan on execution of the project is created and a proposal is made.

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