Question 70: How frequently do you have fires on reformer reactor flanges? What bolting techniques and gasket types do you use to prevent leaks? What other fixes, such as flange resurfacing, have you employed? Do you use steam ri

GRUBB (Chevron USA, Inc.) Chevron has had some experience with flange fires in the past, so I've consulted with Dave Reeves, our corporate expert and also our Best Practice that we've developed for this. I know that I said temporary fixes up on the slide, but it's not really a temporary fix. It's more like you discover you have a leak and decide to temporarily put this on. It's more like temporary while you're figuring out the solution for the right gaskets to use. So we've employed some steam rings around some of these that were prone to leaks. Some of the leaks, since they're hydrogen fires, are not visible during the day, so we've employed wrapping chicken wire around some of the rings to show the burn when it happens. The Best Practice that we developed and came up with was Kamm profile gaskets for anything over 24 inches. Some of the details are that the flange surface should be finished to 125 rms to 250 rms; you should use a high quality graphite material for the gasket covering; and, the stud loads should be set to between 20,000 psi and 25,000 psi gasket stress. We use a modified star pattern for bolting where we do the first four nuts in the star pattern, and then we go clockwise around twice, torquing to 100%. One keynote where we may have had problems since we've come up with these, our gasket selection has been fairly successful. Where we've had problems in the past is where we discovered a flange was accidentally insulated over, and then the bolt stud doesn't hold under higher temperatures. We now try to go make sure that our flanges are not insulated after we've done maintenance.

NEWTON (Roddey Engineering Services, Inc.) Most of the refineries we work at use a two-step torquing procedure. They either get a hydraulic torque wrench or, as our Mechanical Engineer says, they take the end of the bolt and stretch it to 65% to 70% of yield strength and then hand-tighten the nuts. Then, you start heating up. After you reach a specified temperature, just go ahead and tighten it up all the way. One issue that he discussed with me about when we do the hydraulic torquing is to make sure that the service area is clean. You don't want to have anything that would give you false readings. Most of the places we've worked in have had outside contractors come in and do this and that could be recommended.

Another solution we've seen is to use the Bellville type washers. I did not get permission from them to use any kind of diagram, but you can go to their website and see what they look like. But basically, it's a spring-type washer to help the metal contacts or expands. It adjusts for that. Every client we've had use that has had great success with these washers.

HAZLE (NPRA) Relative to the two-step bolting procedure, Shell Deer Park recently had a flange fire on one of their reformers. They have a two-step procedure like that. They missed one of the flanges when they were going around and re-torquing and had a small fire, which then interrupted their startup. So to me, that's an endorsement of that particular feature.

BRIAN HARRIS (Holly Refining & Marketing Company - Woods Cross) I am wondering if most people find that we have more failures. And if you cycle more, do you have to go back and retorque? Let's say, you had a crash-down or a shutdown and you cooled off, do you go back and retorque at that point or are you good once you hot-torque the first time?

GRUBB (Chevron USA, Inc.) I don't believe you go back and retorque.

NEWTON (Roddey Engineering Services, Inc.) We don't retorque either.

MIKE FACKER (Western Refining Company) I just want to mention that as far as finding the leaks, we use a clear camera where you can see a lot of your vapors. It looks like a steam leak coming out of there, and that's been handy detecting some of the leaks when you're starting out.

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