

## Industry Series – Firwin Helps Major Gas Engine OEM Enter New Market

Some insulation projects are more challenging than others. We thought we would share with you one of our more recent challenges, where we worked with a major gas engine OEM for nearly a year, designing a custom insulation solution that will enable their engine to meet a more rigid maritime safety standard required by their customer for an offshore installation.

The story begins nearly a year ago, when Firwin was approached by a major gas engine OEM for help with a new project they had undertaken to meet a customer's need for an offshore application that required compliance with a DNV standard for hot surfaces. (DNV, or Det Norske Veritas, is an international consulting firm that certifies all materials, components and systems relevant to safe operation and quality of ships).

While we at Firwin were in fact familiar with this particular engine, and had indeed successfully designed insulation blankets for it in the past, the requirements for this project were extremely stringent: For the OEM company to obtain DNV approval, they would need to insulate the engine in such a way so that there would be no areas, no matter how small, over 220°C (428° F) over the entire engine exhaust. A typical engine insulated with insulation blankets will have small gaps between blanket sections. In the vast majority of cases, the minimal exposure from these gaps does not affect performance both from a safety and ambient heat reduction perspective, and in fact, typically far surpasses the requirements for most engine applications. To pass the DNV standard, however, the company would need to fire up the engine, and pass an independent audit using a thermal imaging camera, certifying that there are no "heat leakages" along the entire engine exhaust.

Firwin's vice-president of sales & customer service, Brett Herman, was assigned to the project. "The fact that these engines run extremely hot, at times surpassing 1300°F, coupled with the fact that the geometry of the parts, with all the piping and thermocouples, is unusually complex, made this a very challenging insulation project, to say the least", said Brett. "In fact, the OEM had approached other insulation blanket manufacturers prior to coming to Firwin, but these manufacturers were reluctant to take on the project because of the extreme heat, the stringent DNV requirements, and the complexity of the engine."

Firwin's first challenge was to tackle the issue of the "heat leakages" between blanket sections. "We usually will butt up blankets and have the blanket flaps overlap. But here, because of the stringent DNV requirements, this proved to be insufficient, and other strategies needed to be developed", said Brett.



Example of "heat leakage", as viewed with a thermal imaging camera

Under a tight deadline, Firwin went through 3 initial prototypes within a week. Using Firwin's in-house CAD and 3D modeling design capabilities, the first two prototypes were designed long distance, with the OEM providing Firwin with feedback over the phone and through email. Even though the blankets fit well, the requirements were so stringent that it was decided that Brett would fly down to supervise the installation of a 3rd prototype. With the DNV test the following day, Brett and company personnel assigned to the project worked feverishly through the night to get the installation right. The DNV audit was run, and the blankets received approval to be shipped. However, there was still some concern that the installation would be difficult to duplicate without highly experienced personnel, which could lead to problems in the field.

At the time, Firwin was introducing a new type of permanent insulation, known as [Firwin HC \(Hard Coat\)](#), where the insulation is applied at Firwin's facility directly to the part, and then shipped back to the customer. It was thought that this could alleviate the problem by no longer having to struggle with properly wrapping difficult sections of the engine.

The parts were shipped to Firwin and the Hard Coat insulation was applied. The HC insulation performed as required and gave excellent coverage. However, the heat leakage at the joints and thermocouples persisted.

Not one to give up, Brett and his team decided to try a novel double layer insulation technique. "We were definitely heading in the right direction; but there were too many parts to the insulation, making the installation somewhat difficult and not easily repeatable", noted Brett.

By this time, both Firwin and the OEM were now wondering if a solution was indeed obtainable. "Although by this time we had put in a lot of time and effort, and absorbed a good deal of the costs, we felt we owed it to the customer to stick with them until a solution was found", said Brett. The companies brought their teams together, and reviewed all that they had learned so far. It was decided that the only way that this project would be solved was to ship all the engine parts to Firwin, so

that the design team could work on the actual engine parts, as opposed to designing from CAD. "We got the parts, and essentially began re-designing from scratch, albeit incorporating all the lessons we had learned thus far", said Brett.

Having the parts in front of them enabled Brett and his team to arrive at an innovative design that even CAD and solid modeling could not provide. The resulting design incorporated an inner layer and separate outer layer, and reduced the number of parts substantially, so that installation would be easier and repeatable.

The result? The blankets were delivered to the client, and final DNV approval was obtained.

"We are proud that we have helped our customer open up for themselves a new market, and we were glad to be able to be part of the process."

"As for us, it was a chance to showcase our expertise both in designing remotely via CAD and 3D modeling, and in our ability to partner with a client and come up with creative solutions for complex situations", said Brett. "We also learned a great deal about DNV requirements, and will certainly be ahead of the game the next time such a project comes our way."

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