

Torsten Fischer of Krieg + Fischer Ingenieure discusses an investigation related to deficiencies of several solid input devices (solid feeders) at two biogas plants in central Germany

First-person sleuthing, investigation of a silage plate

Torsten Fischer, founder and managing director at Krieg + Fischer Ingenieure, has been an expert legal witness for more than 15 years, covering 130 cases, and wrote his first report about a biogas plant accident more than 20 years ago. In this personal account, Torsten discusses a dispute between an operator and his insurer, exclusively for *Bioenergy Insight*.

Setting

Two fairly big biogas plants, both with energy crops, mostly corn silage, as input substrate, operated by the same operator. Both plants

were built in 2012/2013 by an EPC contractor, start-ups in 2013/2014. Each biogas plant has two digester tanks with a solid input device (SID) in front of each of the tanks. Over a period of six years the operator experienced nearly 200 minor and major repairs done by third parties, not counting the repairs done by his own staff, and finally, completely frustrated, decided to substitute the old SIDs with new ones. He approached his insurer and requested insurance cover for at least part of the costs for the new machines. No agreement was found but both agreed to ask an independent expert to write a report about the damage between 2014 and 2020.

My reaction

What a mess. A SID is always one of the main bottlenecks in a biogas operation. Such a machine has to work but without a stable feeding process the digester tank cannot be operated properly.

The job

With the order, I received several invoices and accident reports. It took a young engineer and me a few weeks to sort them and get an idea what happened over the past six years period. Some damage could be repaired while proceeding with feeding the digester tanks, some needed operations to be interrupted,

while the worst ones required the disassembly of the aggregate, before trucking it to the factory and repairing it there. How were we going to compare such different types of damage? We decided to approach this statistically.

First visit and report

My first visit in summer 2020 gave me an impression about the general situation on site. At that time the four old SIDs had already been replaced. Figure 1 shows SIDs 1 and 2, already discarded.

The statistical investigation was done for eight different independent damage parameters such as conveyors, hydraulic system, steel works, moving floor, wear and tear and others. Each invoice and each accident report was allocated to (at least) one of the damage parameters. Partly, due to poor text descriptions on the invoices we could not allocate invoices to a certain aggregate but only to the site.

What was clear was that wear and tear were not included in the insurance cover and we discovered that we had – in between inspecting other damages – typical wear and tear costs were really high. And while we clearly stated in the report that wear and tear on its own was not relevant, the overall costs for wear and tear were very high over the past six years.

Figure 2 showed an example for the ‘steel works’. The



Figure 1



Figure 2



Figure 3

steel works included the addition of stiffeners and exchange of corrosive steel plates. Figures 3 and 4 provided an example of the problems the operator faced inside the containers. On the bottom of the container is a moving floor that shifts the silage. In order to keep the moving floor adjusted, there are guide rails on both sides. Over the time silage was collected in the gap between the wall and the guide rail, which compacted and bent the guide rail. This finally led to breaks in the steel construction of the moving floor and partly destroyed the hydraulic system. An example of the massive damage of the hydraulic system is shown in figure 5.

Interestingly enough, the value of the cumulated damage per SID did not differ too much but ended up between €85,000 and €105,000. However, the type of damage (damage category) differed significantly. On site 1 (SIDs 1 and 2), moving floors, steel construction and wear and tear. On site 2 most of the costs were the result of the moving floors and, additionally from the beginning by wear and tear. Distribution of invoices over the years did not follow any

pattern. The highest number of invoices were produced on site 1, SID 2, in 2017, and had to do with problems with the hydraulic system. This was the same on site 2 and was closely followed by a number of invoices for the moving floor.

The report comprehensively investigated the damage categories and values of damages as well as distribution of damages over the years. In this publication it can only be shown as an excerpt.

Conclusion

There is no official statistic about damage to solid input devices. Nevertheless, based on my general experience, I assume that even under hard working conditions, the investigated four SIDs showed more than double as much damage as could have been anticipated. And the damage found was significant. It is obvious construction was of poor quality here.

Each one of the SIDs showed significant damage. But for SID 1 it was merely the hydraulic system, for SIDs 2 and 4 the moving floor and for SID 3 nothing specific at all. One of the results of this investigation was that it had not been predictable for the operator what type of damage at what SID, could happen next. What was clear was that the machines were of good working order, but the overall performance was not acceptable. A third result was that the aggregates in principle could fulfil the required function – there was no principle design fault. As a result, only three results together were the basis for the insurer to pay.

The fine print

First solid input devices were developed back in 2001. In the first five years or so they were mostly constructed in mild steel and thin steel plates. Lifetime expectation used to be up to five years. Over the years more and more hot dip galvanised as well as stainless steel constructions became standard. Internal, substrate exposed parts of the steel construction that



Figure 4



Figure 5

nowadays are covered with PE or stainless steel plates. Over the past 20 years there has been a significant rise in quality ... as well as in price. Lifetime expectation for good SIDs is more than 10 years.

The supplier of the investigated SIDs used to be an experienced biogas company with a long track record.

Lessons learned

For me this was the most comprehensive report I have ever written. My young engineer fought his way through all the hundreds of documents we received. The operator learnt that a more thorough investigation at the very beginning would have eased the problems significantly. The original supplier went bust, and cannot deliver his poor-quality machines to others anymore.

Finally, the situation was typical in one aspect. It is not possible to “perfectly” describe in the insurance

cover certain conditions. There are grey areas. The report I wrote was part of the “negotiations” between the operator and the insurer. In this case, finally, an agreement was reached.

Please note: not all details have been presented in full in this article and some elements have been simplified.

Fischer is happy to receive questions at fischer@kriegfischer.de ●

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