

OPINION UNDER SECTION 74A

Patent	GB 2446670 C
Proprietor(s)	Flexlife Limited
Exclusive Licensee	
Requester	Abel & Imray
Observer(s)	Flexlife Limited
Date Opinion issued	10 November 2014

Request

1. Abel and Imray has requested the comptroller to issue an opinion on whether GB 2446670 C (“the Patent”) is inventive in light of eight prior art documents. The proprietor of the patent is Flexlife Ltd.

Observations

2. Observations were received from the proprietor on the 19th August 2014 and observations in reply to these were received on 3rd September 2014. The proprietor then sought to submit further observations. These additional observations have not been considered. The opinion process is intended to provide a relatively quick opinion on the question raised. It therefore consists of three well defined stages – the initial request, observations and observations in reply. The onus is thus on the requester and the observer to present their views in these three rounds.

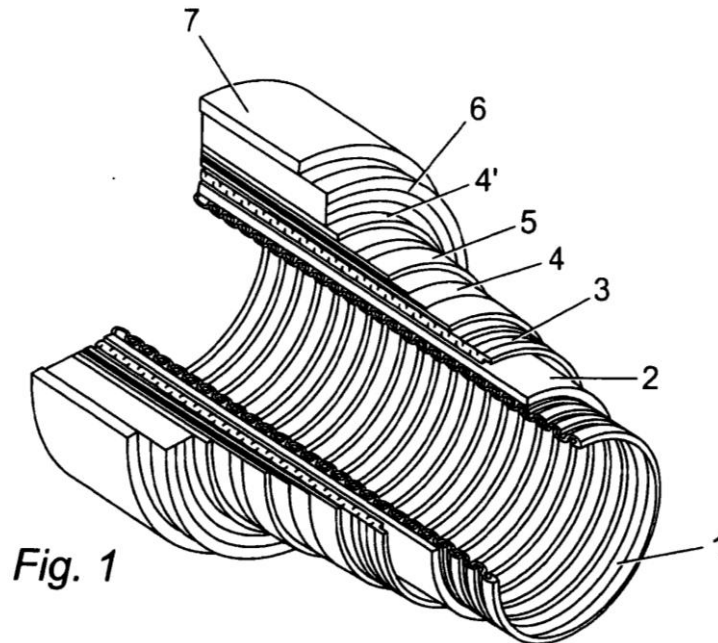
Allowance of the request

3. Two of the documents submitted by the requester (D7 and D8) were considered during previous proceedings under section 27 (see decision BL O/001/13). They were not however considered in combination with the other documents identified in the opinion request. Therefore the question on which I have been asked to give an opinion is in relation to these documents a new question and thus allowable.

The patent

4. The patent was granted on the 7th January 2009 and is still in force. It relates to monitoring the degree of flooding in the annulus of a flexible pipeline using an

ultrasonic scanner. The annulus of the pipeline is defined as the space between the outer sheath (7 in the figure below) and the internal sealing layer such as the internal pressure sheaf (2,3), liner or intermediate seal (9).



5. There is a single independent claim and seven dependant claims. The independent claim was subject to a post grant amendment and now reads.

A method of monitoring the condition of a flexible pipeline comprising the steps of scanning the pipeline with an ultrasonic scanner and producing and/or recording a signal indicative of the level of flooding within the annulus of the pipeline and using the information provided from the signal to determine the level of flooding within the annulus and to identify a flooded section of the flexible pipeline.

Claim construction

6. Guidance on how to construe a claim is provided t in *Kirin-Amgen and others v Hoechst Marion Roussel limited and others [2005] RPC 9*. This teaches that the key point is “what a person skilled in the art would have thought the patentee was using the language of the claim to mean”. I will therefore interpret these aspects of the claim in a purposive manner and interpret them in light of the descriptions and drawings, taking in to account the Protocol to article 69 of the EPC.

7. In this case there is no disagreement about the construction of the claim.

The prior art

8. The requester relies on the following prior art:

(D1) OTC14064, Paper entitled Managing the Integrity of Flexible Pipe Field Systems: Industry Guidelines and their Application and presented to the [Offshore Technology Conference](#) in May 2002

(D2) Article OMAE2007-29186 published as proceedings of the 26th International Conference on Offshore Mechanics and Arctic Engineering in June 2007.

(D3) Manual Offshore Technology Report -OTO 98 018, published in May 1998

(D4) Nondestructive Testing Handbook, second edition, Volume 7, published in 1991

(D5) Article "Continuous structural monitoring of oil rig sub-sea structures for flooded member detection using underwater ultrasound.

(D6) Article "Continuous monitoring guided wave encoded sensor for flood detection of oil rigs cross beam", R Mijarez, P Gaydecki, M Burdekin, WCNDT, published in 2004

(D7) Article "The integrity of flexible pipe:search for an inspection strategy, Engineering Structures Vol 17, pp 305-314, published in 1995

(D8) Internal ultrasonic inspection of flexible pipe NDT&E, Vol 26 p.241, published in 1993

9. These documents can be separated into two groups, D1-D3 which discuss methods of determining flooding in pipes such as risers and D4-D8 which discuss the use of ultrasound techniques including its use in determining flooding of offshore equipment.

10. More particularly D1 discusses testing and analysis for an annulus in a flexible riser. It involves maintaining a stable vacuum in the annulus and pumping a known volume of nitrogen into the annulus until it reaches a set pressure. With reference to the unflooded annulus volume, it is then possible to determine the extent of any flooding.

11. D2 discusses the problem of annulus flooding in flexible pipes. Various techniques are discussed including analysis of gases coming from the riser and vacuum testing using nitrogen, in a similar way to that discussed in D1. In addition, future technologies are envisaged such as using temperature, optical fibre measurements and the use of distributed sensors in the annulus. The document states that "in terms of inspection technologies, today the only regular inspection

widely performed is external video inspection as part of periodic surveys with an ROV. Other inspection technologies are still being developed but are not completely operational or reliable.”

12. D3 relates to monitoring methods for unbound flexible pipes. There does not seem to be a great deal of discussion on detecting flooding in an annulus of the pipe but it does mention measuring and analysing gases in the annulus which may indicate water ingress.

13. D4 discusses the use of ultrasonic analysis and its use in a number of applications. One application that is discussed is the use of ultrasonic testing in offshore structures including thickness gauging, corrosion testing and weld testing. It also discusses flooded member detection and this involves the use of ultrasonics to determine whether a tubular member is flooded. It further states that the use of ultrasonic analysis to detect a flooded member “stretches the capability of conventional ultrasonic systems” due to the member being submerged and the effects of corrosion.

14. D5 relates to structural monitoring of oil rig sub-sea structures for flooded member detection using underwater ultrasound. It states that although non-destructive testing methods such as X-ray imaging and ultrasonic arrays have been conventionally used for flood detection and that reasonably good results are produced, the techniques are expensive to deploy and demand special enclosures and strict safety precautions.” It goes on to describe an experimental system of permanently attached ultrasonic sensors to monitor flooding of structural sub-sea members in offshore oil-rigs.

15. D6 discusses a method for flood detection of oil rig cross beams and mentions that non destructive testing (NDT) such as the use of ultrasound has been used to inspect the presence of water. It further states that testing with NDT underwater ultrasonic probes are “expensive to hire and operate”. It then goes on to discuss a guided wave sensor system to detect flooding.

16. D7 relates to inspection strategies for determining the integrity of a flexible pipe. One technique used to determine wall thickness used ultrasonics and it was concluded that “further development of the probe configuration would be needed for establishing the feasibility of the method and that the ultimate accuracy in the field would, at best be 10%”. The document makes no mention of flooding.

17. D8 discusses internal inspection of a flexible pipe. An ultrasonic method is described for determining thickness and cross-sectional analysis of the pipe. The document is not concerned with determining flooding.

Inventive step

18. Guidance on how the requirement that the invention involves an inventive step should be determined is provided in *Pozzoli SPA v BDMO SA [2007] EWCA Civ 588*. This sets out the following approach:

- (1)(a) Identify the notional "person skilled in the art";*
- (1)(b) Identify the relevant common general knowledge of that person;*
- (2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;*
- (3) Identify what, if any, differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim or the claim as construed;*
- (4) Viewed without any knowledge of the alleged invention as claimed, determine whether those differences constitute steps which would have been obvious to the person skilled in the art.*

19. In this instance the skilled person in the art is someone that is involved in testing of underwater pipes and structures. I have given consideration as to whether they would have knowledge of only testing pipelines but I agree with the requestor that the skilled person's common general knowledge would be wider and would include knowledge of testing for flooding of pipes and also other submerged structures.

20. The inventive concept of the claim is clear. It is the use of an ultrasonic scanner to determine a level of flooding and to identify a flooded section within an annulus of a flexible pipeline.

21. The requester presents a number of alternative starting points for step 3. The first is based on any of the known methods set out in documents D1-D3 or as described in the patent. The requester argues that the skilled person looking for an alternative to these methods would have "naturally consulted" documents D4, D5 and D6. The skilled person would then have found a clear incentive to use ultrasound scanning as an alternative method to detect flooding in a pipe annulus.

22. The observer argues that to the contrary there is simply no incentive for the skilled person to look for an alternative method since the known methods as disclosed in D1-D3 and the patent were workable methods. It goes on to argue that even if the skilled person was minded to consider D4-D6 then he still would not arrive at the invention. The observer contends that D4-D6 are concerned with testing for flooding in a hollow member for example a pipe. This is not the same as using ultrasonic signals to detect the level of flooding in an annulus of a flexible pipe. It suggests that detecting water in an annulus is technically different to detecting a level of flooding in an annulus of a flexible pipe. It goes on to suggest that this would be evident by comparing the respective scans produced.

23. The requester counters these arguments by referring firstly to the description of the problems with the existing methods set out in the patent itself. The relevant part of the patent is on pages 4-6 which I paraphrase below:

“There are presently two common methods of monitoring the condition of the annulus of a pipe; positive pressure testing and vacuum testing.

In the first case, this requires the pipe to be shut down and typically takes 12-16 hours per test. ...In order to accurately perform this test the original annulus volume (V1) must be known, this should be recorded in the factory during the acceptance testing of the pipe. Often this is not performed and therefore use of this method is not very accurate. With the second test, the pipe must also be shut down for the test to be carried out which typically takes 12-16 hours per test..... This test can use calculation to derive the theoretical annulus volume, this is an inaccurate method of deriving the volume.

Both tests to evaluate the condition of the annulus take many hours to complete and rely on the pipes being shut down to perform. This is a costly exercise ...

.The actual volume evaluated can be prone to inaccuracies especially if the annulus volume was not requested by the customer at manufacture. There is therefore the potential for a pipe to be deemed not flooded in partial flooded cases and subsequently fail due to inaccuracies of the test.

There is a safety concern regarding these tests, the annulus can contain permeated gases such as H₂S, or hydrocarbons, these pose a risk to the technician and the asset the flexible pipe is connected to.

Even where the tests discussed above show that the annulus is flooded, neither allow the operator to assess the condition of the tensile armour or pressure armour wires. Indeed there is no reliable method of evaluating this other than calculating the corrosion due to annulus environment. Methods such as x-ray are difficult to use reliably due to the layered construction of the flexible, not to mention the safety aspects regarding the source required for this type of testing.

Intelligent pigging of flexible pipes has been attempted without much success again mainly due to the multi-layered Construction and the time required to build up comprehensive picture make this test too expensive.

The present invention aims to provide an inspection method, which overcomes or at least mitigates the aforementioned problems in monitoring the integrity of the annulus of a pipeline.”

24. The requester goes on to argue that these shortcomings would encourage the skilled person to seek an alternative method. I think the requester is right on this. But would it then be obvious to use the methods in D4-D6 and if so would that render the claimed invention obvious? I am not convinced it would. Even if I assume that the skilled person would refer to these documents as a matter of course then to arrive at the invention it is necessary to substitute an ultrasonic based technique for detecting flooding within a pipe and then use that in a new way to detect flooding in an annulus of the pipe. I do not see how the skilled person could make such a substitution without employing imagination or inventiveness. There is nothing in the disclosures of D5 and D6 to suggest that the systems described in these documents could be used to produce the sort of scan necessary to determine the level of flooding in the annulus. The system in D4 is more sophisticated and could be viewed as providing some form of thickness gauging though this is not the same as determining the level of flooding in an annulus. In addition the teaching of this document would appear to

be move away from the invention. It notes for example that the use of ultrasonic analysis to detect a flooded member “stretches the capability of conventional ultrasonic systems”. D5 and D6 also highlight potential problems with ultrasonic detectors.

25. The requester’s alternative starting point is documents 7 and 8. It suggests that the skilled person would know from these documents that ultrasonic signals can be used to determine the integrity of the annulus of the pipeline. The skilled person would know from their general knowledge, and from for example D4, that ultrasound can be used to measure flooding in tubular subsea members and thus combining these two pieces of knowledge he would arrive at the invention of claim 1 without any inventive effort. The observer notes that neither D7 nor D8 teach the idea of using ultrasonic testing to detect flooding within the annulus of a flexible pipe. It notes further that testing for flooding in a hollow member for example a pipe is not the same as using ultrasonic signals to detect the level of flooding in an annulus of a flexible pipe

26. It is my opinion that the skilled person would not be able to arrive at the invention from the teachings of documents 7 and 8 without employing inventive effort. There is simply nothing in either of these documents that would lead the skilled person to use the signals to detect flooding the annulus.

Opinion

27. It is therefore my opinion that claim 1 is inventive over the evidence supplied. Claims 2-8 are appendant to claim 1 and it therefore follows they are also inventive.

Lyndon Ellis
Examiner

NOTE

This opinion is not based on the outcome of fully litigated proceedings. Rather, it is based on whatever material the persons requesting the opinion and filing observations have chosen to put before the Office.