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Managing Technological Risks: A Challenge for Professional Engineering Insurers

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1. Introduction

In the future, the management of technological risks will be linked more strongly than ever before to new developments and advancements in technology.

In dealing with this subject, therefore, it is absolutely essential to consider the impact of technological developments on the insurance industry, and especially their impact on engineering insurers and their management of the risks in their portfolio.

A huge number of technological developments are expected to become reality in the 21st century. Five basic areas can be identified to form the key technologies, which will be of great significance for the insurance and reinsurance industries during the next few decades:

- Information technology;
- Energy and the environmental engineering;
- Medicine and genetic engineering;
- Micro-systems and new materials;
- Transportation and traffic systems.

There is not much one can say about information technology that has not already been dealt with in countless media reports. In the area of telecommunications, thanks to wireless networks, hugely impressive growth rates are enjoyed. For example, the number of mobile phones has already exceeded the 1 billion mark, years earlier than first predicted in spite of the fact that half of the world's population have never even made a phone call. Today, fully automated production lines manufacture some 260 million mobile phones a year.

As regards the risks derived from information technology, know-how and loss experiences in electronic equipment insurance, software business interruption insurance and network cessation insurance play a very important role in developing a strategy for insuring Internet and e-commerce risks.

Energy and the environment, new materials, transport and traffic systems are areas, in which engineering insurers will need to devote a great deal of attention to over the coming years.

Looking at the example of a current development in the area of transportation, it becomes apparent that assembly and repair times in the construction of power plants and installations will be radically reduced. Trading in shares of a company named Cargolifter has recently commenced on the Frankfurt stock exchange. New materials and technology, for example the non-flammable gas helium, make it possible to build a cargo airship which is very different from its predecessor, the Zeppelin. The latter was destroyed in an explosion in

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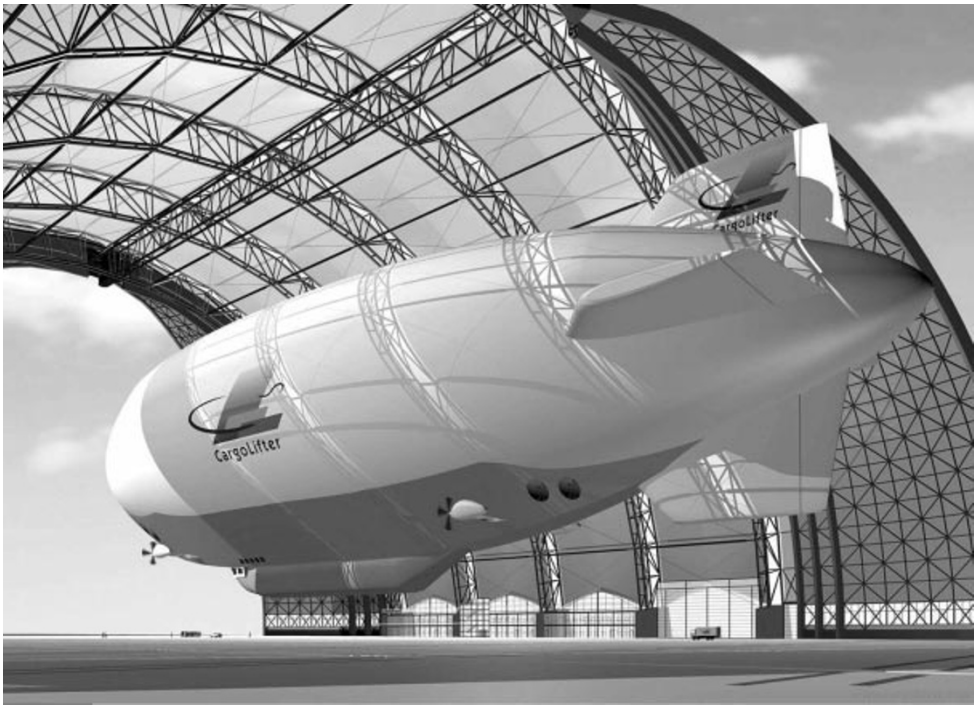

Figure 1.

Lakehurst, U.S. in 1937. When comparing the differences between Zeppelin and Cargolifter very interesting features come to light.

The Cargolifter (Figure 1) will be able to transport state-of-the-art pre-assembled gas or steam turbines weighing up to 160 tonnes. Just a few days after they have left the manufacturing plants in Europe, Asia or the U.S. they can be installed at power plants in India, China or Brazil. Pre-assembled units can be positioned by the Cargolifter directly onto the completed foundations, thus avoiding frequent reloading and much of the traditional erection work (see Figure 1).

This will bring about fundamental changes in transportation and erection processes and in the associated risks involved for property and business interruption insurers. This modified exposure will, with the help of their underwriting experts, need to reflect the insurers' price calculations.

2. But why transport a gas turbine to India?

In the first century AD there were only about 200 million people in the world. The global population is now increasing steadily, from about 6 billion today to some 12 billion in the year 2050, i.e. it will double in the space of about 50 years. Asia will contribute a lot to this growth. Human beings, whether they are poor or live in luxury, need energy, a lot of energy. The world's energy requirements have doubled in the last 30 years. The annual energy growth rate

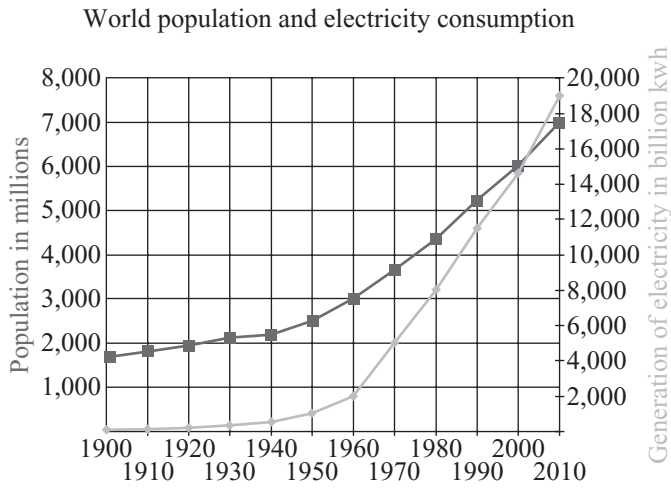

Figure 2.

in developing countries is four times higher than in industrialized countries. (The effects of these developments are shown in Figure 2.)

Nevertheless, industrialized countries are the chief culprits as regards *per capita* CO_2 emissions. However, new power plants totalling some 18,000 MW per year are being constructed in developing and threshold countries. The main fuel used is coal. Therefore the causes of many global environmental problems are increasingly shifting to these countries.

At the same time, more efficient use of primary energy through improved thermal efficiency at conventional power plants is becoming increasingly important. Today, gas turbines with approximately 260 MW output are being operated and the thermal efficiency of gas and steam turbine combined cycle power stations has improved up to 60 per cent. Soon tandem compound combined cycle power plants with an aggregate output of 500 MW will be on the market. However, this will also increase the risk, and even minor faults or defects in manufacture, construction or operation may result in huge losses at major power plants. The investments of such plants run into sums insured of $1 to 2 billion per location and more.

3. Infrastructure projects for transport and traffic systems will also require high levels of investment in the future

The renaissance of rail traffic has already begun in many countries. Modern high-speed trains travel at speeds that allows them to compete with aircrafts over short to middle range distances. With 500 km/h it seems the limit has not yet been reached. In order to achieve this, large-scale infrastructure projects are necessary with new high-speed rail tracks, spectacular bridge constructions (see Figure 3) and ever longer tunnels. The construction of underground railway systems is booming in many of the world's cities.

Tunnel construction has caused many engineering insurers a severe headache in the past. In future, underwriters of such infrastructure projects will be faced with a double challenge: evaluating the risks of new construction methods with extremely difficult ground conditions

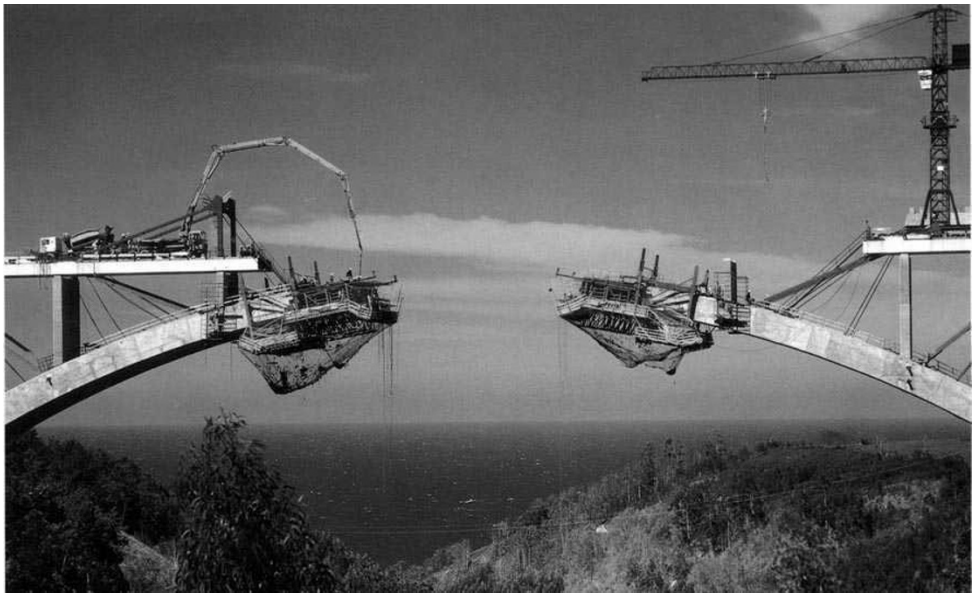

Figure 3.

coupled with controlling ever broader insurance conditions. This casts serious doubts on the chances of risk carriers making any profit with such wide covers for highly exposed risks.

There is a tendency to believe that the great suspension bridges, such as the Öresund link between Copenhagen and Malmö, which was opened on 1 July 2000, constitute the limit of technological development. The truth is, however, that projects like the 50-km link over the Rio de la Plata from Buenos Aires to Uruguay or the Japanese suspension bridge in Akashi with a free span of 2 km in a highly exposed earthquake zone present quite unique engineering challenges. An aerial photo from Hongkong's impressive airport link is another example.

The construction of new airports, some of them built directly on land recently reclaimed from the sea, was one of the great challenges for engineering insurers in the 1990s. Hong Kong, Kansai Airport at Osaka and Spata Airport at Athens are just a few examples.

The speed of technological progress will continue to accelerate rapidly. It is of existential importance for insurers and reinsurers involved in the engineering insurance lines to keep a constant eye on this development, to track it and to understand it. In today's globally developing world of technology, it is of fundamental importance to successful business operations for the engineering insurer to keep pace with technological progress and to be just as aware of its successes and failures as of lessons to be learned from losses.

4. However, investigating past loss experience leads inevitably to a series of questions:

- Is it possible to anticipate the development of losses; to predict future loss scenarios?
- Will there be even greater catastrophes than there have been up to now?
- In terms of engineering insurance: will machinery, CAR or EAR losses regularly exceed sums of US$100, 150 or 200 million?

We believe there will be a marked increase in major engineering losses in the future. There are four main reasons for this:

(a) Engineering insurers throughout the world are increasingly writing Delay in Start up (DSU) covers, not only in the industrialized countries. Serious DSU losses that are on a par with the extent of the actual liabilities have not occurred yet, but this is only a matter of time.
(b) The increase in natural hazards exposure, particularly in Construction and Erection All Risks insurances, cannot be ignored any longer. As it is, the emerging economic revival in Asia, South America and Europe will lead to a dynamic growth in investments and thus to growing demand for these insurance products, not only in areas with natural hazards exposure. This is accompanied by the trend towards concentration of values in industrialized areas.
(c) The general tendency is that clients are aiming increasingly towards broader scopes of cover. Higher amounts of indemnity in the event of a claim are the logical consequence of this development.
(d) Eventually, insurers and reinsurers will gain a completely new loss experience in the field of Internet risks, as regards to both the nature and magnitude of losses. Due to global networks and the resultant accumulation effects, close observation and research is required particularly in relation to the enormous business interruption exposure.

5. Risk assessment

When accepting new technological risks, in particular major engineering and construction risks, careful risk assessment and expert control is a precondition. Thorough evaluation of comprehensive underwriting information, site inspections, loss prevention and research as well as claims handling are part of this process of risk management. This process attempts to reduce the probability and the magnitude of hazards, whilst at the same time trying to manage residual risks.

Greater emphasis is increasingly being placed on monitoring construction progress and physically inspecting larger, complex projects. Only through that active involvement can be ensured that engineering lines of business can be further pursued successfully, particularly in times of low premiums and extensive covers.

6. Challenges

The examples of mega construction projects and their claims potential demonstrate the magnitude of the exposure and responsibilities of engineering insurers. They demonstrate the challenges which engineers are facing from a technical and logistical point of view. Whilst the technology of many of these risks is tried and tested, at least on a smaller scale, it is however difficult for insurers to fully control the risks involved in keeping within schedules, in performing such projects in other cultural and development locations, and in coping with the political, legal and financial implications.

Nevertheless, investors and developers will seek cover against the consequences of these risks, i.e. against resulting property and pure financial losses.

Besides dealing with the above challenges, engineering insurers also have to be prepared for another, sometimes enormous challenge: their working environment is changing. For

engineers, change means challenge. For engineering insurers the question is: Who or what is challenging them – and what are the opportunities and solutions?

Five major challenges have been identified in this context.

6.1. Challenge 1: privatization or the trend towards authorities taking a back seat in infrastructure projects

The public sector is increasingly transferring to private investors its responsibilities for planning, financing and operating long-term infrastructure projects, such as transportation systems, utilities, waste disposal, communication systems and even correctional facilities. Contrary to the old days, where all risks in connection with such projects were usually "insured" by the taxpayer, private investors and lenders look for risk-minimization. This creates a new demand for extensive insurance cover.

A closer look at the insurance requirements of privately financed infrastructure projects reveals often tough challenges even for the most professional engineering insurer:

- BOT/BOO projects require a comprehensive multi-line/multi-year package cover.
- Cover for "force majeure" (not to be confused with "Acts of God"), "penalties", and "liquidated damages" is increasingly in demand, not to mention other entrepreneurial risks.
- The banks and financing institutions would like to protect themselves 100 per cent. They ask for direct indemnification of investors. Protection of investments has first priority whilst repairs appear to be of secondary importance only.

The engineering insurers' opportunity lies in the drafting, negotiating, and concluding of bearable long-term, multi-line insurance agreements, sometimes extending over periods in excess of ten years.

A further opportunity is also provided by adequate risk management, monitoring, inspecting. Accompanying a project from as early a stage as possible (not only when problems arise) and throughout construction, erection, testing, commissioning and during the first operating years, provides the engineering insurer with the opportunity to keep in close contact with the risk.

Engineering insurers' opportunity lies in having skilled staff available and adequate resources to be able to perform an expert service and to understand sometimes very sophisticated, hi-tech claims.

6.2. Challenge 2: deregulation and liberalization or the end of predictable market behaviour

The days are gone when insurers and reinsurers lived in protected environments, protected by monopolistic structures, by regulation, by tariffs. As competition for terms and conditions is gaining further ground in various markets, tariffs become obsolete. Fears about anti-trust actions make insurance people shy away from participating in associations, insurance committees, etc.

At brokers and consultants the staff is increasingly confronted with the new slogans: "Further, quicker, cheaper". This high-profile strategy is unfortunately often causing a loss of information quality and a never-ending creativity as regards extended terms and conditions. This is a continuous challenge to engineering insurers and requires a huge amount of processing, invariably associated with time pressure.

If "Knowledge is power" is understood as an opportunity, it will ultimately lead to success for those engineering insurers which maintain their know-how or are even able to enhance it continuously.

Even if tariff is not a popular term these days, only the claims experience of a global engineering insurer allows pricing commensurate with the risk. In addition, the insurer will underline his competence in the form of model policies, clauses and comments. It will incorporate its expertise in working groups, in its range of training opportunities for people, companies and the market as a whole.

6.3. Challenge 3: globalization or the continuous consolidation process in the world's insurance markets

Every merger of insurers means there is one insurer less. The groups are getting bigger, financially stronger and need less reinsurance, except in major-risk business, where the reinsured values and liabilities are constantly rising. This increases the risk of massive fluctuations in results and makes balancing within a portfolio more difficult.

At the same time, global insurers often force their regional subsidiaries into a hard, turnover-oriented and price-driven competition, sometimes consciously accepting underwriting losses in the process. The old-established local insurers react accordingly in order to defend their market share.

This situation, however, presents opportunities for the engineering insurers. The local character of most business means that only with local representatives can one get near enough to clients and their risks. Thus, locally operating global engineering insurers' benefit from special knowledge that newcomers to the market usually do not have.

This knowledge is there to be used: Their longstanding risk and loss experience, evaluated intelligently, updated regularly, regionally diversified in connection with exposure-oriented, prospective pricing and the setting of conditions and of course readily available, i.e. IT-based with global networking, make specialist engineering insurers and reinsurers a sought-after partner for their local partners and independent insurers alike. Their experience, the proximity and availability of their advisers, their risk-management capabilities benefit all concerned: from the first risk assessment through to the placement of risks.

6.4. Challenge 4: restructuring—or structural changes and new tasks in insurance companies and the insurance industry as a whole

Structural reorganization entails a variety of risks which engineering insurers have to face:

- Single-line specialist insurers run the risk of losing business due to a lack of flexibility if they are unable to write complex insurance concepts, such as the already mentioned BOO/BOT projects, because of such covers not being common in their standard portfolio. Obtaining more flexibility is one reason for the increasing trend of implementing new organizational structures in the insurance industry.
- Loss of business through "poaching" is the reverse risk run by specialist engineering insurers. For example: their property colleagues are forced to grant EAR cover for a new production line at the renewal date for a automobile manufacturing plant. Another typical example is the almost everyday inclusion of machinery insurance in other classes of business.

– The risk of being "forced into a corner" is a particular challenge not to be underestimated by engineering insurers. There are sometimes attempts to force an engineering specialist into the role of adviser or service provider. The buzzwords "client orientation", "response time" and "key accounts" harbour a trend towards generalization and away from specialization of lines, such as engineering.

The opportunity lies in convincing partners and clients that engineering insurers are the ideal and main contact points and have the technical know-how needed for:

– major technological risks,
– technically complex IAR accounts,
– requests for multi-line covers.

Engineers and engineering underwriters provide the expertise for these tasks and are at the same time insurance practitioners with commercial responsibility for their underwriting results. They are both underwriters and technical claims handlers, client advisers and trainers.

6.5. Challenge 5: the growing convergence of insurance cycles worldwide

In the context of competition and globalization, the subject of cycles in insurance and reinsurance and more specifically the growing convergence of insurance cycles worldwide needs to be addressed. The truly global fields of insurance and reinsurance such as earthquake and storm catastrophe insurance, such as aviation fleet insurance, such as large industrial and engineering risk insurance, today develop in almost global cycles.

The reason for the growing convergence of cycles is the growing integration of the world economies, which since the famous or infamous oil crises has been developing increasingly in parallel as far as periods of growth, stagnation and recession are concerned. These converging cycles have the detrimental consequence for the global insurer and reinsurer that geographic spread does not help them to the same extent as in the past, when they could expect that bad results in one market would most likely be compensated for by good results from others.

Cycles often are, it seems, a wonderful excuse. Those who refer to them give the impression that the cycles just happen, as if they hit us like good or bad weather. But this is not true. We ourselves make the cycles, we, the reinsurers, insurers, intermediaries and our clients.

It is up to engineering insurers to make use of the opportunity not to accept their apparent dependence on such cycles. They should be aware that they are carrying risks which, if larger and heavier, can mostly only be carried over quite long periods. The fact that the inevitable losses, do not and should not occur every year, but maybe only every third, fifth or tenth year, should always be kept in mind.

Reinsurance and insurance prices should not reflect good or bad luck within a short period, but should be based on today's and tomorrow's exposure. Our pricing therefore needs to be a prospective rating based on expert risk analysis of present and future exposure.

It is hoped that it is not too naïve to propose that our industry, insurers as well as reinsurers, should try in the future to get away from pricing as seemingly a function only of more or less capacity and move into the direction of a consensus between sellers and buyers on the prices necessary to assume certain risks over certain periods.

By these means engineering insurers might overcome the negative impacts of unnecessary cyclical ups and downs – in their own interest, but also in the interest of more planning security, and more continuity for their clients.

7. Conclusion

Since the introduction of engineering insurances into the market 150 years ago in Great Britain, most innovative technologies have been accompanied by engineering insurances. However, it would be interesting to know, what progress technological development would have achieved without the doyen support of the engineering insurers as a true partner over the past century.

From the beginning of the industrial age, exposure, loss potential, losses and insurance covers of technological risks became ever more difficult, ever more hazardous, ever more complex. Really new is the ever increasing speed of the development.

The risks, and thus the loss potentials engineering insurers will have to assume will become even more complex, more hazardous, more difficult to assess, to price and to control. This requires the highest standards in providing best practice insurance and reinsurance, training and research and up-to date engineering knowledge and information technology.

Technological development entails a risk of change! For engineers, change means challenge. The challenges for engineering insurers are to be found in the future development of technology! Therefore, professional engineering insurers and reinsurers should have a strong and deep interest in the potential technological developments of this century.

This will enable them to offer substantial added value to their clients, assisting them to take advantage of the chances and opportunities offered through new technological developments.