Revamping and modernisation of machinery and equipment
Concepts for coverage including testing and commissioning

Prepared by:

Jean Scheidecker, Axa Enterprises, Paris
Robert Glynn, Benfield Corporate Risk, London
Gregor Hosse, Allianz, Munich
Robert Abt, Munich Re, Munich
Frank Thyroff, GDV, Germany
Thomas Aström, Pohjola, Finland
Peter Frankhuizen, Delta Lloyd, Netherlands
Ingvar Bodin, Zurich, Sweden
Kenji Ito, Sompo, Japan
Utz Groetschel, IMIA Secretary
Industry requires machinery and equipment in operation to be revamped and modernised at certain times for reasons that may be quite diverse, such as safety, law, efficiency or change of market or product. The risks involved in such works must be carefully analysed as well as the values at risk before terms and conditions of cover can be decided upon and an adequate price set. Brokers and underwriters are required to put the necessary information together, on the existing plant and machinery as well as for all details of the contract works. This paper aims to provide guidance for making the necessary considerations of risk evaluation and relevant insurance concepts in respect of possible extension to existing insurance covers as well as additional contract works covers and associated business interruption protection.
1 Introduction

Today, existing production machinery, equipment or processes are complex and highly specialised and to keep up to date with developments require more frequent revamping or modernisation. These works may involve in some cases minor direct work on the existing equipment, in other cases the extent of work may be quite substantial like complete dismantling and reassembling and require critical works and technology. These operations are usually far different from simple servicing and maintenance.

The reasons for requiring these works of revamping or modernisation are numerous and are dependent on technological or economical, legal or other developments.

Sometimes projects include a relocation of a machine or equipment.

Of course, an underwriter’s main concern is to be able to estimate the risks involved in these works, evaluate the importance of technological changes distinguishing pure exchange of parts of a plant from technological upgrade and involvement of prototype features. The question is: “are the works going to involve a specifically high or low risk exposure? “ This delicate task of assessing the risk exposure is dedicated to the insurance engineer or underwriter who will base his view on the information provided for the project.

This paper focuses on revamping or modernising works where a significant involvement of works on the existing machinery and possibly major technical changes are expected to take place.

These kinds of revamping or modernising projects require a specific approach with regard to insurance. Firstly, clarification is required as to the extent that existing plant and machinery is involved. Secondly, the value of the pre-existing equipment, over and above the contractual revamping costs needs calculating.

Besides these questions underwriters may have to consider the potential for business interruption. Damage of even minor works may have significant impact on production.

These risk features and the liabilities between the various parties involved need to be identified and carefully studied.

Insurers must be in a position to define the scope of cover, but also to provide advices or risk surveys in order to discuss possibilities of reducing the risk exposure according to best practices.

2 What is revamping and modernisation of machinery and equipment?

The kind of works involved in these operations can vary substantially depending on the kind and size of the machinery or plant concerned, the goal to be achieved, the technology involved and other parameters of the contract, the expertise of the manufacturers, contractors and principals planning the revamping or modernisation.
2.1 Revamping / modernisation, typical kinds of work

Revamping is a term not used everywhere. In Longmans dictionary the word is defined as the action of “arranging something in a new way so that it appears to be better although often there is no real improvement”. Well, if its condition or capability is better afterwards than it was before, this would be an improvement. A simple dictionary says: “to give renewed strength or effort to machinery or equipment”.

The term is commonly used in our context to describe the action of bringing machinery, equipment or full plants, which have been in operation for a longer period, back to perfect working condition with the standard being up to date and is comparable to a complete overhaul of a machine, equipment or plant. Such overhauls may include improvement in material, design or controls.

An example could be a steam boiler being retubed, i.e. the old steam tubes showing a high degree of wear, tear or corrosion are being replaced by clean new tubes. These tubes may be of original material / quality or of improved quality available at the time of revamping. - or an electric machine, like an old generator being rewound, the new copper winding may incorporate improved insulation material.

Example of Revamping Works at a coal fired power plant (The Netherlands)

The pictures show a big overhaul and revamping job of a boiler and steam turbine generator set of a coal-fired power plant. This work was insured under an individual EAR policy, including a section for cover of Existing Property, and this value was also taken into account for the risk exposure of the works and for the premium calculation.

This plant has two lines and one line was upgraded. During the works the other line was in full operation. It is very important that in advance there should be an inspection to review the scope of work (risk survey). Also during the works like this one lasting for 8 weeks and involving in total 600 workmen, inspections should be done.
But also upgrading works of turbine blades and the generator rotor were done:

Controlling the medium pressure rotor of the steam turbine

The generator rotor undergoing works

The logistics in respect of workforce, materials and equipment are highly important.
Special attention should be given to the picture below. On the right hand side is a blue torque motor to drive the rotor of this medium pressure turbine slowly for balancing. However some welding activities were done behind the cardboard in the back. From a risk management point of view these circumstances are critical:

These pictures were taken at an inspection.

Such revamping works are certainly much more extensive and comprehensive than the regular servicing or maintenance of machinery, equipment or plant and need detailed analysis of technicalities and risks, especially for more complex systems than the first examples above.

**Modernisation** is somewhat different from revamping. Modernise = “installing modern equipment or adopting modern ideas or methods”.

Modernisation would not necessarily require that the machinery or plant be fully overhauled. It could involve replacement of parts, components or controls by those of improved quality, performance, efficiency, output or safety or other improved features or could involve changes of process or product for adjustment to changes in economical or market requirements or to adhere to new environmental standards or governmental requirements.

The technical circumstances of revamping and those of modernisation are quite comparable, but in the latter case the technological criteria are more demanding and need to be studied more carefully in order to understand the risks involved. Here the area of new or even unproven technology may often be involved.
Example of refurbishment of a blast furnace: technology and logistics challenges

Due to the scale of the project and the huge masses it involved, assembling the hearth posed a particular technical challenge. The furnace shaft, weighing some 860 tons, was suspended from steel scaffolding and secured in order to separate it from the lower furnace.

Staff were working directly in front of the old blast furnace and welding together the 70 millimetres thick annular metal rings.

The old furnace hearth was dismantled before the actual relining work. The furnace was tapped via a low borehole and the residual “furnace sow” – some 160 tons of pig iron – was flushed out.

The relining was expected to take one hundred days, with a further ten days scheduled for blowing-in and starting up the blast furnace. However, thanks to the outstanding commitment and diligence of all those involved - and flawless co-ordination - the new blast furnace was re-commissioned three weeks ahead of schedule.

Source: Salzgitter Flachstahl

Pre-assembly of the new furnace hearth at blast furnace A (May 2005) – the white tarpaulin protects the welding work from the wind
2.2 Reasons for revamping / modernisation

The aim to be achieved by revamping / modernising machinery, equipment or plant may have quite different reasons, and this may result in quite different risks involved in the works.

The main reasons can be:

- Age of the equipment, signs of wear and tear
- Energy savings
- Improvement of efficiency
- Increase of output / performance
- Extension of the lifetime of the equipment, machine
- Improvement for maintenance works
- Environmental strains or legislation changes
- Relocation of machinery or plant in a different place in the plant/process
- Change in saleable product, or product quality etc.
- Changes in raw material or other supplies
- Improvement in safety of operation
- Introduction of new and more sophisticated control equipment
- Testing of latest technology for future development
- Attracting public interest or public funding
3 Evaluation of technical risks involved

To know or understand the reason behind the intended revamping or modernisation activity may be of great value for assessing the risk, especially such circumstances as to the items machinery/plant concerned, the extent of such work, the technology involved (as original, upgraded or new, maybe unproven).

Whatever the extent of revamping or modernising works to be carried out, whatever the reason behind it, each operation will be specific and in general nothing but a case by case study can give a good overview of the risk exposure. This is why underwriting information must be put together in a detailed and comprehensive way, not only on
- the new works and components to be invested
- the design and technological features thereof (novelty or prototype character?)
but also on
- the existing plant and machinery
- its operational processes, changes or variation of processes
- the extent of work done on them (dismantling, overhauling, relocation, reassembly)
- plant items, machinery or essential parts thereof that need to be transported to a manufacturer or service shop for overhaul, upgrading or modernisation
- the conservation measures during standstill
- the inspection/survey report of site and existing equipment before the commencement of the works
- the status document on condition of existing machinery/equipment before commencement of the works
- the logistics, security on working site (e.g. adequacy and availability of existing sprinkling system during testing and commissioning phases)
- the constraints of working in narrow space within valuable surrounding property
- the time constraints to get the machinery/plant back into operation within the shortest possible time
- the testing and recommissioning activities
- the extent to which the principal and his staff are involved in the design, planning and execution of the works
- the experience of contractors in carrying out such works
- the experience of designers and manufacturers in such works (often very special and individual)
- Other essential facts or circumstances special to the case (such as conflicts between new design specification and original design (compatibility) or the question of the risk of breakdown being enhanced due to smaller technical safety margins on upgraded machines).

Clarification of these technical aspects will provide the essential information for evaluation of the more severe and possibly less exposed, moderate elements of the risk involved. In this respect see also “Questions helping to understand the circumstances of a refurbishment job” in appendix III.
An example of a modernisation on an old plant is to have its control systems upgraded from an analogue to a Distributed Control System which may sometimes also include Advanced Controlled Optimisation. It is important that operators are properly trained on these systems otherwise problems can occur due to unfamiliarity with the new system.

An example of revamping an individual machine:

Related to turbines:
For blades and vanes of a turbine (especially for gas turbines) the lifetime is related to the equivalent operating hours (EOH). There is a trend to extend this lifetime for obvious reasons of economics. Specialised firms developed a methodology for this purpose called “rejuvenation”

Work is done during an overhaul of the machine. The technological criteria of interest to insurers of the plant is that the purpose of it is not to replace the turbine blades by new ones but to treat them in order to extend the lifetime beyond the lifetime advised by the original equipment manufacturer (OEM). The insurers may question, what will be the guarantee and liability of the contractor and that of the OEM. Contractors will limit their liability to the amount of the delivered works. The OEM will not accept any liability.

The Insured/principal may just see the economic and financial benefit. But insurers of the works as well as those of the later operational plant have to take into account that they may have a higher risk exposure during the works and during testing, commissioning and operation.

The technical underwriting scenario assumes that the client (principal/project contractor) and / or broker are willing to spend the time and effort with underwriters so as to allay their concerns.

Not surprisingly, if the client does not spend time preparing clear information and answering detailed questions, it is very unlikely that underwriters will respond positively.

4 Providing insurance cover for Physical Loss or Damage

When arranging cover for a refurbishment job, several options have to be considered. Some of the more complex refurbishment jobs require a specific Contract Works policy. Other, particularly minor refurbishments and modernisations, probably the majority of contracts in terms of numbers, are or can also be covered under operational Fire, All Risks and/or Machinery insurance policies.

The owner of the plant and the contractor(s) involved will need to discuss the options of including the works in the operational policies and/or a special contract works (EAR) cover with their broker or insurer beforehand. It is important to fully appreciate the various interests, exposures and responsibilities before covers are placed, in order to avoid unnecessary gaps in cover for any of the parties, as is possible in respect of limits, perils covered or location, e.g. if valuable items of plant
have to be moved from the premises to a manufacturer or service shop for carrying out specific works.

This graph shows where property is exposed (coloured areas and transportation arrows) and the various responsibilities (black arrows). The dotted lines express secondary responsibilities.

4.1 Insurance of refurbishment works in connection with the operational cover

For the interest of the Owner / Principal great emphasis has to be laid on achieving a seamless interface with existing policies, especially for the principal having already a Property and/or Machinery insurance cover.

4.1.1 Insurance cover provided under an existing Fire policy

An existing Property (Fire or All Risks) insurance would normally not cover works not forming part of the normal operation of the plant. For this purpose many operational policies feature an additional cover on a first-loss or full value basis, which grants cover for small to middle-sized refurbishment works. In case of a large-scale refurbishment, where such limits are exceeded, a solution must be found not only for the new installed items, but also for the exposure to existing surrounding property, especially where the contractor has to take full responsibility for the plant and machinery worked upon. In these discussions also the question of any recourse / non-recourse agreement between the parties for damage covered by the existing insurers but for which a contractor may be responsible has to be clarified.

In case the Property insurer is not prepared to grant cover for the refurbishment works under the Fire/All Risks policy, a Contract Works policy (EAR e.g.) is to be issued with a number of special considerations, such as the question of specifying clear definition of interfaces, responsibilities for existing property, subrogation rights and waiver of such rights between parties and policies.

4.1.2 Insurance Cover provided under an existing Machinery Breakdown Insurance

For plant covered by specific Machinery insurance the machinery and equipment is
usually also covered during maintenance, cleaning, repair and overhaul including
dismantling and re-assembling works related to these activities.
This cover may even be extended to workshops where such works are carried out
(often for more limited perils).
Typically the machinery is covered up to its full value without limits except for
depreciation for age.

When the borderline on the regular maintenance/overhaul activities, still covered by
a Machinery insurance policy, is passed, the more comprehensive refurbishment /
modernisation works need complementary cover under the Property or an EAR
Policy. Discussion with the existing Property and Machinery insurers will clarify,
whether and to what extent a separate Contract Works (EAR) insurance in the joint
interest of the contractor and the principal is required. And discussion with the
contract works insurer will involve the question of full cover or limits of indemnity for
existing plant and machinery besides the cover of new items and the cost of works
proper.

4.2 Insurance cover provided by a contractor’s master policies

Larger manufacturers or service contracting firms often have a kind of master policy
for a defined kind of works up to a limited sum insured, either in form of an
Engineering EAR open cover or – in cases where the main exposure lies on
possible damage to surrounding property -- in form of an extension to a liability
cover. These covers may also apply to works carried out for revamping /
modernisation contract works. However, in most cases the master policy provides
only a small limit of indemnity for existing / surrounding property, the reason being
that underwriters of an open policy have no information on the values that could be
involved and the degree of exposure to damage from the contract works. Therefore,
either a higher limit is agreed for individual cases on merits of information supplied
or a separate individual policy is issued. The various parties involved should also be
aware of the limited perils covered under the extension for Existing Property under
contract works policies, which is not full All Risks of such policies but only loss or
damage resulting from execution of the contract works. In order to avoid gaps of
cover the existing property (if full responsibility thereof is not transferred to the
contractor and the value not added to the contract works sum insured) needs to
remain insured under the existing Property / Machinery covers for remaining perils
such as natural hazards, fire or other physical damage not resulting from the works.

4.3 Insurance cover provided by a separate EAR policy

4.3.1 Differences between EAR-underwriting of a grass root project versus a
refurbishment job

In all cases where a separate EAR-insurance has to be issued, the underwriters are
faced with the challenge of evaluating a one-off-project, not comparable with a
regular grass root construction project. The challenge has several interesting
aspects. Here are some principal differences:
Terms and conditions for a grass root EAR project are typically based on:

- The total contract value, which corresponds to the new replacement value of components supplied and works involved. It normally reflects the value-at-risk and can be taken as base for the sum insured
- Underwriters need to evaluate technical information for the new works only
- There is no dismantling works involved for property not even included in the contract value
- Transportation, if to be covered, concerns only the supplied new goods from the manufacturer / supplier to the site. The value thereof is included in the contract value
- In most cases experience exists with similar projects. Hence statistical rates are available
- Equipment is brand-new and complies with current codes and standards; spare parts availability is generally not an issue. No complication of testing with existing plant involvement
- Standard wordings and clauses are available and well suited to adapt cover
- The equipment is new. Indemnification will be “new for new” is the rule.

This situation is quite different for an EAR policy for a refurbishment, where:

- The contract value of the refurbishment works does not correspond to the total value at risk and involved in the works (see chapter 4.1). Most of the time when revamping or modernising works are concerned the amount stated as contract value is the cost of the contract works (workmanship + value of new parts and equipment supplied), not including value of the machinery / equipment worked upon. The values are normally not given, neither their actual value nor their new replacement value (NRV). Since underwriters EAR-premium rates are based on
and applied to NRV of the contract works sum insured, particular attention has to be paid on how the additional values of the existing plant and machinery are to be adequately considered.

- There are only very few similar projects, if at all, to draw from the knowledge and experience for the revamping / modernisation process. Each one may be quite different from past ones. I.e. there is no statistical data available to establish rates other than the rates for the standard machinery erection works (see chapter 4.2); furthermore rates for similar works would not be comparable, if the values at risk for existing plant and any limits of liability applied are not comparable.

- Underwriters need to carefully study not only the construction of the new works. The work upon the existing plant including the implications of testing need also a very cautious study, as often it is here where the main risk is involved.

- Part of the equipment is pre-used; influence of operating history is hard to evaluate; compliance with current standards can be an issue; in case of loss or damage, spare parts may be difficult to get. Different components are exposed by works in a wide range from just remaining untouched until being reworked or replaced. Replacement parts or equipment may differ from the original ones and may cause additional concern.

- Dismantling of existing plant and possible transportation to and from workshops in order to carry out special works on these items must be included in the underwriter's considerations.

- Caution must be taken with covers provided by standard wordings, which can be problematic in connection with used equipment, especially in respect of cover of testing operations and in respect of faulty design, material or workmanship. This is certainly an issue as the condition is unknown and contractors have no responsibility other than for new design and material/equipment (see chapter 4.4)

- Basis of Indemnification of used existing plant, equipment or material must be negotiated (see chapter 4.5)

Therefore all the points mentioned above under chapter 3) ‘Evaluation of technical risks involved’ need to be carefully evaluated by the underwriter. And in addition, any cover granted by existing property / machinery insurance can be taken into account and any possible waiver of recourse agreement.

4.3.2 Values at risk and Sum Insured

Besides the technical underwriting aspects and details of the contract works, the underwriter must have a clear understanding of the values of the property being involved or being at risk. In setting up the contract value usually only the costs of the actual works to be carried out and of the newly supplied material and components are included, whereas the values of the existing plant, machinery and equipment undergoing the works is not included, and surrounding property not directly involved may be exposed to damage resulting from the works activities.

A major concern for insurers is to evaluate reasonable values of the existing plant / equipment undergoing works. This equipment consists mostly of machines with a longer service life behind them, since they are under modernising or revamping process.

Principle of Machinery insurance is to base the calculation of the premium on the New Replacement Value (NRV) of the machinery. This applies to Contract Works
insurance as well, but for existing / surrounding property commonly first loss limits or limits per occurrence are applied not expressing the actual values at risk.

In order to get a clearer picture of the values involved in a refurbishment / modernisation job a distinction into the following categories can be helpful:

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New components / replacing components</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Existing plant and machinery first category</strong></td>
<td>Components being worked upon</td>
</tr>
<tr>
<td><strong>Existing Property second category</strong></td>
<td>Components being protected, moved or disassembled in order to allow the works to be carried out</td>
</tr>
<tr>
<td><strong>Existing Property third category</strong></td>
<td>Actual “surrounding property” not being worked upon</td>
</tr>
</tbody>
</table>

For refurbishment works a variety of methods for estimation of the values involved can be seen in practice, e.g.

1) New replacement value for machinery and equipment newly supplied
2) Contract value for cost of works + newly supplied machinery and equipment
3) Existing plant and machinery: Residual value of existing plant / machinery before refurbishment
4) Existing plant and machinery: Original purchase costs of existing plant / machinery
5) Existing plant and machinery: Actual market value of existing plant / machinery after refurbishment
6) Existing plant and machinery: Value of similar type of machinery / equipment to the existing plant and machinery undergoing works.

Applying standard technical EAR-rates on items 1) and 2) may be reasonable for this part of the values involved, but for inclusion of cover for existing plant and machinery of the first and possibly second category the simple application of the rate to a loss limit or an arbitrarily chosen sum insured will not lead to a fair and risk commensurate premium, whereas usual methods of including Existing Property under a reasonable loss limit will be acceptable for Existing Property of the third category 3 and possibly also second category.

Although the value of the refurbishment contract in 2) gives a good idea of how much work will be carried out, it does not include the value of the items, which are involved. For evaluation of the values at risk and the subsequent influence on premium required at a given loss limit the underwriter has to follow one of the methods as under items 3) to 6), depending on what values are actually available for the individual risk.

Figures of method 3) residual values are generally not very helpful, because much of the machinery may already be written off to a minor book value or even Zero. Original purchase costs in 4) and actual market value in 5) do not reflect the NRV of the items but taking the past service life of the individual items into consideration, a reasonable guess of their NRV may be possible. Method 6) produces values similar to 5).
Thus a pragmatic approach can be found for setting up a sum insured for the total of values involved:

Sum Insured = Contract Value for Refurbishment Works + Value of items being worked upon

This figure is mainly a figure of interest to the underwriter. It may not be necessary to use it as sum insured in the contract works policy, unless probably in cases where the contractor takes over full responsibility of a plant under a very comprehensive revamping / modernisation contract, until it is handed back to the owner / principal.

The figure set up for the items being worked upon can in any case be stated as part of the underwriting information.

In cases where the responsibility for certain items of existing plant or machinery is fully transferred to the contractor the value of these items should be added to the sum insured in any case as these need the full All Risks cover of the contract works policy including fire and natural hazards risks. Property insured under the heading of Existing / Surrounding Property is usually only covered for loss or damage resulting from the contract works!

In these cases the items concerned must clearly be described and valued, and the Sum Insured is then produced by adding the property value of the existing plant (= property supplied by the principal) to the contract value supplied by the contractor.

If the existing property value (first and possibly second category) is not included in the sum insured, the figure to be set into the policy for cover of Existing Property besides the contract value for the works, can be stated either as full value for this extension, or, more likely to happen, a lower figure as a loss limit. The size of the limit could correspond to an estimate of maximum loss or less. Much depends on the relation of the value of the existing plant and the contract value and the underwriter’s preparedness to accept high limits

Additionally or included in such limit, a first loss cover can be introduced for such existing property, which is surrounding property not worked upon (third category):

The subject of covering high limits for Existing Property is also discussed under another heading in the IMIA-paper WGP-53 (07). There also a distinction is made between two general kinds of Existing / Surrounding Property:

a. Existing / Surrounding property being property, which is belonging to or is in the care, custody and control of the contractor, the principal and others directly involved in carrying out the contract works (an explanation is also given in CAR-Form E 334.0-E (Munich Re). This kind of Existing Property is insurable under section 1 of a contract works (CAR/EAR) policy.

b. Surrounding property of third parties adjacent to the site does not fall within the property insurable under section 1 of the contract works policy (CAR or EAR). Third Party property can be insured (additionally to a.) under section 2 – TPL cover under a contract works (CAR/EAR) policy.
Cover of surrounding property of third party is not considered to cause more concern for revamping / modernisation contract than for any other project and therefore does not need any further discussion in this paper.

4.3.3 Establishing an appropriate risk premium for Contract Works insurance

The challenge for a refurbishment project is that suitable book rates do not exist and that the value at risk must first be established to which such rate or adjusted rate should apply. And if values for contract and the various categories of existing plant and property have been reasonably established, the rate applicable to each of these will have to be adjusted on the merits of the technical information of the project and any limits applying for Existing Property. Once a premium has been worked out on this basis, the premium rate for the project can be worked backwards on whatever has been agreed to be set in the policy as Sum Insured (in most cases the contract value as per item 2 under the heading ‘Determination of values at risk’ above):

Refurbishment Rate = Refurbishment EAR Premium / Sum Insured

But how to work out the rating details in the first place?

Due to the absence of specific statistics for individual kinds of refurbishment contracts, the grass root contract works rate can just be the starting point for establishing a risk-adequate refurbishment rate. The rate normally calculated for construction of similar plants varied by the technical risk details (time schedule, testing period, exposure to natural hazards, extent of coverage (not yet including extension to and values of the existing Property), level of contract value and deductibles, technology standard etc., may be applicable to the contract value excluding surrounding Property. This generally modified rate may include inter alia factors like:

4.3.2.1 Working environment specialities
- Narrow space
- Complicated access within existing plant
- Delocalisation of existing plant items
- Transportation logistics

4.3.3.2 Rate modifier Project Set-up
- Contractor’s / sub-contractors’ experience to undertake (total or part of) the works (Original manufacturer or other?)
- OEM / contractor’s guarantees
  Original guarantee expired usually after the first or second years after purchase. In most cases the refurbishing company will not provide a full guarantee of the plant / machine after a revamping or modernising work, only for new components and works. The extent of guarantees granted by the contractor is an important indicator for insurers about his confidence in his own works.
- Testing responsibilities of principal and contractor (only supervision?)
The Existing Property is under somewhat different risk conditions. e.g. exposed to dismantling, possibly transportation to a workshop and back plus reassembly, unknown technical condition (not new), testing under upgraded / modernised conditions etc.

If the value of the items worked upon and put under full responsibility of the contractor is added to the sum insured, full All Risks cover applies, but for cover under the extension for Existing / Surrounding Property external causes like natural hazards or fire from outside would not be relevant.

Therefore the rate applicable to the value of the various items of existing plant needs a lot more technical considerations and modification. Consideration of the various aspects mentioned under chapter 3 'Evaluation of technical risks involved'. Here are some of the major rate modifiers to be considered:

4.3.3.3 Rate Modifier “Extent of Works”

The underwriter has to assess how the exposure for the planned refurbishment works compares with a regular from-ground-up installation of the same machinery. If this extent differs for the individual components of the plant, a differentiated approach is necessary, at least for major components. It has to be considered that part of the machinery is at risk two times: once when being disassembled and a second time when being re-assembled e.g. in the table below various items of machinery with specific New Replacement Values (NRV) undergo different activities:

<table>
<thead>
<tr>
<th>Machinery item</th>
<th>NRV (US$)</th>
<th>Activity</th>
<th>Rate category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5m</td>
<td>untouched</td>
<td>Surrounding Property</td>
</tr>
<tr>
<td>2</td>
<td>2m</td>
<td>disassembly, replaced by new one</td>
<td>disassembled replaced</td>
</tr>
<tr>
<td>3</td>
<td>3m</td>
<td>disassembly, reworked, re-assembly</td>
<td>worked upon</td>
</tr>
<tr>
<td>4</td>
<td>2m</td>
<td>disassembly, transport to/from work</td>
<td>worked upon, incl.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>shop, reworked, re-assembly</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3m</td>
<td>disassembly, not longer valid</td>
<td>disassembly only</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The modifier is to be assessed for each category by the underwriter according to degree of higher or lower exposure compared with new construction work.

4.3.3.4 Rate Modifier testing

The testing procedures and risks involved have to be carefully studied, as in most cases cover will not be required for new equipment only, but including the refurbished plant. Depending on extent of cover which usually has some limitations as to losses resulting from previous use, ageing, and faulty design, material or workmanship, the testing rate needs adjustment, again up to the evaluation of the risk by the underwriter.

4.3.3.5 Rate Modifier method of evaluation of value at risk

The technically modified rate would apply to the NRV. As often only other values like market value, depreciated original value or other deviating values are available, an adjustment covering this aspect is necessary.
4.3.3.6 Rate modifier for limitation of indemnity

A limit of indemnity like a loss limit per occurrence or an indemnity limited to actual value (not new for old) etc., is to be considered adequately by a factor which considers the ratio of the estimated NRV to the limit agreed.

Further circumstances may have to be considered as the case may be. The graph below shows the main interdependence of pricing of revamping / modernising projects:

4.4 Indemnification Aspects

Precondition for any proper loss adjustment is a wording, which has defined the crucial points of indemnification issues in case of loss or damage to the works. For new components or works the indemnity will usually be full indemnity for repairs and replacement “new for new”, even in case of total loss (not exceeding the insured contract value). But for existing (used) plant and equipment special conditions should specify indemnification in case of partial and total loss:

- **Partial Loss** that can be repaired economically:
  Generally the policy conditions will allow that used equipment will be indemnified in the same way as new equipment “full costs of repair works including replaced material and components (new for old), however occasionally spare parts are limited to their depreciated value (used for old), especially for components with a limited service life (e.g. GT blades or electrical windings). Underwriters may wish to link this question to the form of declared values at risk: “new for old” in the case new replacement values were declared, but depreciated spare parts, if the sum insured contained depreciated values only.

  Depreciation rules should be established: depending on kind of plant e.g.:
- operating hours
- consumed lifetime of item
- actual wear and tear

In case a limit of indemnity applies to existing plant and machinery, the amount of indemnity will be limited to this amount.

**Total Loss**

The trigger for a loss being a total loss: should be defined. If the plant is damaged or destroyed beyond economical repairs, the loss will be considered a total loss. The limit for economical repairs could be defined as:

- new replacement value
- actual cash value of the plant
- purchase value less depreciation for age / used service life
- replacement value for equipment of similar size and age.

In standard EAR-policies (e.g. Munich Re wording) the trigger for a total loss is often the actual value of a damaged machinery item immediately before the loss occurrence.

Again, if a limit of indemnity applies to existing plant and machinery, then the total indemnity will not exceed this limit.

### 5 Providing Business Interruption cover

This is an essential aspect for the owner / principal of the plant or works, because in case of a major delay due to a loss event he may suffer high loss of expected income which may be critical to finance the business or funds taken up for the revamping / modernising works.

**5.1 General considerations**

The business interruption (BI) loss could occur either as per

- Case 1
  A plant or machinery continuing operation during the works (unlikely to happen for plant undergoing these contract works) is interrupted due to a loss event resulting from the contract works

  Cover should be provided via an inclusion of the works perils under existing Property / Machinery BI policies. The turnover and sum insured is related to the ongoing business and a Delay in Start-up cover does not apply.

- Case 2
  The existing plant or machinery is taken out of operation in order to carry out the works and, to a larger or smaller extent, comes under the custody and control of the
contractor. It will come back into operation jointly with the newly installed components.

In this case it is generally possible to cover the BI risk under an Advance Loss of Profits / Delay in Start-up (ALoP / DSU) policy in the principal’s interest.

This graph illustrates the BI constellation for the existing plant and the project (the dotted line represents a minor possibility (e.g. if the new or modernised plant will finally be electrically linked into the existing general switch board of the existing plant):

However there is one severe obstacle to overcome: ALoP /DSU policies usually have a standard exclusion of this or similar form:

“The Insurers shall not be liable for loss of gross profit and/or increased cost of working due to any delay caused by or resulting from loss of or damage to surrounding property …”

This will say that BI due to delay is only coverable for newly supplied and installed equipment.

The intention of this exclusion is however to exclude BI for damage to property of the principal as per case 1 above and any other existing surrounding plant not related to the project proper and the anticipated business therefrom.

Underwriters therefore need to look at the existing plant directly involved in the works (worked upon) in the same way as at newly installed plant and equipment. This would be simple if this plant is under full responsibility of the contractor and part of the objects insured under the total works sum insured of the Material Damage section of the contract works policy and not under the extension for Existing Surrounding Property. In the latter case underwriters should consider a special exception from this exclusion for specified items of existing property of the first category (as defined under 4.1 ‘Values at risk and Sum Insured’ above), and, as the case may be, also for items of the second category. The cover for these items would follow that of the Existing Property extension of the Material Damage
section of the policy, i.e. liability for BI would be restricted to delay due to loss or
damage resulting from carrying out the contract works.

In order to avoid misinterpretations these items should be clearly described and the
limited extent of cover also be stated in the DSU section of the policy.

Remaining perils may stay covered by existing BI covers under Property /
Machinery insurances in order to avoid unnecessary gaps of cover.

5.2 Risk considerations

The BI cover has to be evaluated, similar to the Material Damage (MD) cover, on
the specific circumstances and merits of the project details. However, once the
material damage aspects have been elaborated, the conclusions for the BI cover
usually suggest themselves.

Existing plant and machinery does not automatically come under the DSU cover.
The plant involved in the works and anticipated to come back into commercial
operation upon completion of the works and testing, need to be directly linked or
related to the business to be insured under the DSU cover in order to be acceptable
insured items under the DSU policy.

Another question to be looked at by the underwriter is, whether the BI cover can
follow in each respect the MD cover or needs some specific restrictions, or is there
an aspect to be included beyond the MD cover if the material damage is taken care
of elsewhere? This could apply to existing plant covered by existing policies where
the contractor is responsible for material damage but BI needs to be included in
existing BI policies.

Before accepting a DSU cover, agreement on strict risk control and regular up-dates
on the technical aspects and the time schedule of the project is a requirement here
more than for other projects.

5.3 Business Interruption - Sum Insured

The BI sum insured has to be verified. The Insured’s previous gross profit figure
may no longer apply unchanged, because in many cases the revamped /
modernised plant may achieve a higher turnover than the old plant, but the prospect
of a higher turnover must be realistic within the Indemnity Period to be covered.

Also the economics and cost structure applicable to the renewed plant may have an
influence on the gross and net profit of the insured.

5.4 Rating Aspects

Calculation of appropriate DSU premiums is a delicate matter in general because of
the many aspects to be considered in respect of technical risk, natural hazards, BI
sum insured and the influence of Time Excess and Indemnity Period which need to
be set at adequate levels.
In the case of revamping and modernising works not only the new items installed / integrated in the plant are of relevance. The risk involved in the works on the existing plant items need to be included as for the MD cover, but here in respect of the BI effects.

As a clear guideline as how to rate all these aspects does not exist, the guideline for the underwriter can only be to start rating with a comparable standard construction risk and take proper care in evaluating all special risk elements mentioned and discussed above in this paper.

6 Covers and wording

6.1 Material Damage

6.1.1 Extensions to existing Property / Machinery covers

In some cases insurers of existing covers may agree to extend cover to include work being done on the existing plant and machinery, if not included in the wording already such as often found in Machinery policies:

“This Policy shall apply to the insured items after successful completion of their performance acceptance tests whether they are at work or at rest, or being dismantled for the purpose of cleaning or overhauling, or in the course of the aforesaid operations themselves, or when being shifted within the premises, or during subsequent re-erection.”

(Machinery policy wording Munich Re)

In cases where the items need to be transported to workshops for works to be carried out there, the cover may be extended to include at least certain risks outside the premises by the following extension to the existing policy cover:

“7. Temporary 7.1 The insurer shall indemnify the insured in respect of any loss Removal of or damage to property insured (other than stock and or goods in process and or finished goods, and or raw materials and or supplies if insured hereby) temporarily removed for cleaning, renovation, repair or maintenance to any other location whilst in transit thereto or therefrom by road, rail or inland waterway. “

(Comprehensive Machinery Insurance wording Munich Re)

In many cases the risks involved in the works and the responsibility of contractors in the revamping / modernising works of a plant may well exceed the risks and limits that can be covered or found acceptable by Property / Machinery insurers under existing policies and a separate contract works cover is required.

6.1.2 Contract works cover

If a contract works cover issued for the contract works in addition to existing covers or alone, the cover needs some special features to be considered beyond the
standard contract works covers as provided by common CAR or EAR policy or other Project works cover in order to meet as far as possible the special risk circumstances and requirements discussed above.

- Inclusion of cover for existing / surrounding property
  It is recommended to set up separate limits of indemnity for different categories of existing surrounding property:

  a) for property directly worked upon for revamping / modernisation
     (This limit should be set, if acceptable to the insurer, close to the actual value at risk or at least at the level of the PML of it.) Alternatively it may be appropriate to include the value in the contract works sum insured in cases where the contractor accepts full responsibility during the works until hand-over back to the principal.

  b) for other existing / surrounding property of the insured
     (at a level one would usually set for a normally exposed risk from adjacent or nearby contract works)

- Inclusion of cover for machinery or plant being worked upon at other locations (workshops) (defining limitations of cover as may be appropriate)

- Inclusion of inland transportation for such items

- Defining exclusions or extent of perils covered for property worked upon and tested, depending on circumstances e.g.:

  - exclusion of loss or damage due to pre-existing defects, deterioration, wear and tear or as per :
    Munich Clause 203 - Exclusion Concerning Used Machinery

    It is agreed and understood that otherwise to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the Insurers shall not indemnify the Insured for loss of or damage to the insured used items
    - attributable to previous operation
    - attributable to dismantling (if dismantling is not covered)
    - in respect of any non-metallic parts”
    This may not be appropriate where a machine has been fully overhauled.

  - exclusion of manufacturers risk for machinery plant or parts not new i.e. only cover as per:
    LEG1/96- The London Engineering Group Model “Outright” Defects Exclusion

    “The Insurer(s) shall not be liable for :
    Loss or damage due to defects of material workmanship design plan or specification”
• full exclusion of testing of machinery and equipment not new or restricted cover as per following wording:

  “… Insurers shall not be liable in respect of damage to any part of the … plant arising out of testing and commissioning, which is due to a defect pre-existing or attributable to previous operation but this exclusion shall not apply to:
  - other insured property which is itself damaged as a consequence
  - new machinery or property”

- Other limitations in indemnification than loss limit
  This could be time value or market value in cases where an item of machinery or plant or material of the existing property is destroyed beyond repair

- Defining extent of cover for other effects of the revamping or modernising project on specific items or the plant as a whole, e.g. from unproven design, material or procedures.

There may be additional circumstances to be considered by special terms and conditions as the actual case may be, and it is the underwriter's skill to carefully analyse these and to adjust terms and conditions adequately.

6.2 Loss of Profits (Business Interruption)

6.2.1 BI within Existing Property / Machinery Covers

Those BI covers should stay active for all Existing / Surrounding Property as described under 5.1 above, even if a DSU (or ALoP) cover is agreed where items of Existing Property are included due to the limited perils covered for these items under DSU.

In cases (usually smaller overhauling or revamping / modernising cases) where no specific contract works or no DSU cover is set up, or where the limits therein are insufficient, conditions for extending the existing BI cover to include BI following loss or damage resulting from the revamping / modernising works should be agreed. This extension is not unusual and often is combined with a non-recourse agreement with the contractor.

To include the cover for Property items that are moved to workshops and back in order to carry out specific works could also be agreed by specific condition describing the extension of cover.

These conditions could be similar to the German standard clause 19c to the policy for cover of Increased Costs of Working as shown in appendix II. But Underwriters may consider a more limited version.

6.2.2 DSU covers

As discussed under 5.1 General considerations, BI – Case 2, for all new works and components, standard DSU (ALoP) conditions attached to a Contract Works policy
would apply, which may even include inland transportation risks. For items of Existing Property which is taken out of operation for carrying out the works and which are worked upon, i.e. items of the first and possibly also second category as defined under 4.1 ‘Values at risk and Sum Insured’ above, a special exception has to be defined from the standard exclusion of “loss of gross profit and/or increased cost of working due to any delay caused by or resulting from …
- loss of or damage to surrounding property”,
and the detailed description of these items must be attached and their limited cover must be stated to be only for delay in start up due to loss or damage covered under the Existing Property extension of the Material Damage section. This exception is not required if the items are under full responsibility of the contractor and their values are included in the total sum insured of the contract works, as described under 5.1 General considerations, BI – Case 2.

The underwriter is of course advised to consider the need for other specific conditions to comply adequately with specific risk or contract circumstances, as the case may be.

Setting reasonable values for Time Excess, Indemnity Period and the DSU Sum Insured should not cause undue concern over that of standard construction risks.

7 Loss experience / loss examples

7.1 Refurbishment of a Gas Turbine:

A major loss occurred to existing property during a contract for replacing some blades of a gas turbine

During a planned outage of a gas turbine power plant in order to replace a number of blades, a crane failed while lifting the rotor out of a gas turbine.

The rotor of massive weight sank to the ground with resultant damage to various parts of the rotor. The supports - prepared to receive the rotor - were hit by the coupling flange on one side and by turbine blades of row 1 on the other side and were pushed away a few metres. The balancing beam and the steel ropes of the lifting equipment fell onto the rotor damaging the area of compressor stage 1. The crane trolley hit compressor blades in the area of the stages 14 to16. On the turbine side, several blades of four rows were affected, and the straightness of the rotor was doubtful.
Inspection and repair of the rotor involved a complete disassembly of the blades in order to allow detailed checks on the rotor as well as on the blades. It was necessary to send the rotor and the blades back to the manufacturer. In the meantime a new rotor including new blades was ordered. This allowed recommissioning of the gas turbo set two months after the accident.

Repair of the damaged rotor was achieved within 4 months which served then as a spare.

7.2 Retrofit of a boiler:

In the 60’s, Soviet Union manufacturers installed boilers, steam turbines and generators in a Power Plant in Romania. At the end of the 90’s, the local operator decided to improve and retrofit the two main boilers.
Subject of the retrofit was:
- Automation and computerising of the process (hot start, fast stop/fast start)
- Restoration of wall insulation
- Exchange and increase of number of overheater pipes (six layers of pipes in front of the burners)

One of the major difficulties of this project was the lack of documentation from the original design and the history of modification.
A Western contractor won this revamping works contract.
Works took place from 1999 till end of 2000.
Commissioning phases started in the early 2001. During commissioning, several fast stop/fast start and hot start were experienced.

During a test, vapour pressure decreased suddenly and water level dropped.
A first investigation discovered a broken pipe, and a colour change was noticed on several other pipes.

After analysis, it was concluded that the vapour flow had been stopped in the pipes. Due to the high temperature near the pipes - they were located near the burners - they were overheated. One pipe even burst out; the others suffered metallographic modifications.

After further investigation about causes of the phenomenon, the Western contractor discovered that a main horizontal collector pipe was connected to the vertical pipes at the bottom of the boiler. This pipe was not reported in the documentation and drawings available and there was also no information on any level control systems. This pipe had been installed in order to collect condensate vapour, but no drain pipe has been observed.
The contractor had to conclude that during hot start - fast stop / fast starts tests, condensed vapour had reached a high level and the horizontal collector was full of water. The vapour flow was restricted or purely stopped, so no vapour flow was circulating in the pipes, which were overheated.

Damages suffered:
- One pipe broken,
- Several pipes with metallographic change, which were considered as totally damaged
- Several pipes with small metallographic modification
Repairs engaged:
Due to the specific pipe configuration (quantity and geometry), an exchange pipe per pipe was not possible and a complete layer change had to be programmed (three on six)
Delay for delivery of new pipes was about one year. So, in order not to stop the commissioning and electricity generation during the winter period, the main part of damaged pipes was blocked temporarily.

As the exchange could not be done on the inner side of the boiler, the wall had to be cut, insulation to be dismantled, pipes to be cut, and the new pipes assembled, and the wall rebuilt.

The repairs took three months, and costs reached about 600 000€.

To avoid this loss, the technical solution should have been:
- Visual inspection of existing pipe networks and compatibility with existing documentation
- Installation of a drain on the collector
- Modification of the hot start, fast stop / fast start processes to avoid a too high condensate.

7.3 Fire in an existing saw mill while testing:

A sawmill intended, during the summer break, replacing the existing sawing line with a new line of higher capacity. The sawing line was located in an older building to a large extent built of wood. During the same period other extensions and alterations should be carried out e.g. in the adjacent building for the sorting line.

The saw mill is fully sprinklered but to dismantle the old sawing line it was necessary to remove the roof and furthermore close down and remove sections of the sprinkler installation.

As hot works were necessary for the removal of the sawing line the insurers were asked for permission to close down sections of the sprinkler installation and to perform hot works. The fire brigade was also advised of the work to be performed.

The requirement of the hot work permit was to employ a security guard on full time.

Early one morning a fire was discovered in the sawing line and the fire brigade was called. While waiting for the fire brigade, which arrived 15 minutes later, the fire developed dramatically and the fire brigade could only focus on saving the adjacent buildings which they successfully did. The building with the old sawing line was a total loss.

Loss estimate:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings:</td>
<td>EUR 1,600,000</td>
</tr>
<tr>
<td>Machinery:</td>
<td>EUR 600,000</td>
</tr>
<tr>
<td>Loss of Profits:</td>
<td>EUR 600,000</td>
</tr>
<tr>
<td>Expediting expenses:</td>
<td>EUR 110,000</td>
</tr>
<tr>
<td>Total:</td>
<td>EUR 2,910,000</td>
</tr>
</tbody>
</table>
The Loss of Profits could be reduced by moving production with additional shifts at other sawmills belonging to this timber company.

Conclusions:

Any close down of sprinklers in plants with a high fire load such as a saw mill must be carried out with great care and guarding and other means of protection must be introduced to spot and fight any fire incident as early as possible. A continuous and close follow up of the compliance with the rules for hot works is furthermore absolutely necessary.

In this case it is questioned and being investigated if the security guard fulfilled his duties and if the hot works performed by the contractor was carried out according to the rules. If any breach of duties or rules are confirmed the indemnity will be reduced. Subrogation might also be possible.
APPENDIX I

Estimation of insured value

Example of Japanese Market approach

Specific estimation of values for EAR (Contract Works) Insurance for revamping projects (Japan)

1. Estimation of value at risk
In case of request of an indication of EAR cover for a rehabilitation works contract by our client the total contract value stated by the client is composed of only the cost of works.
The following four alternatives can be suggested to the client.

Case 1
Type of Insurance: EAR Annual Open (Wrap Up) policy
Total Sum Insured (TSI): Only contract value = only the cost of works
Conditions:
- Flat Limit of Liability (L/L) shall be applied.
- Old machinery, which will be modernised, shall be covered provided that indemnity is based on restoration cost.
- Article of underinsurance shall not be applied.
Premium:
- Sum Insured (SI=only the cost of works) x special rate
Summary: Although new replacement value of old machinery is not included in SI in this case, Restoration costs of damaged old machinery are also covered subject to L/L, and a special rate is calculated considering also following issues.
- Past loss record
- L/L is set to be relatively small such as $1MIL, at largest $10MIL.
In other words, SI is the only base of calculation of premium.

Case 2
Type of Insurance: EAR Annual Open (Wrap Up) policy
TSI: Contract value + Agreed value of old machinery as a result of agreed calculation scheme based on a characteristic factor for type of machinery, for instance,
- Contractor = Manufacturer or Contractor of Boiler
- Interest = Rehabilitation works of Boiler of Power Station
- Value of old machinery = Output of steam (t/h) x $... per t/h
Conditions:
- Flat Limit of Liability shall be applied.
- Old machinery which will be modernized shall be covered provided that indemnity is based on restoration cost.
- Article of underinsurance shall not be applied.
Premium:
- SI (= the cost of works + agreed value of old machinery) x normal EAR rate
Summary: Restoration costs of damaged old machinery are also covered subject to L/L, and the rate is calculated considering following issues.
- Past loss record
- L/L is set to be relatively high such as $50MIL, at largest $100MIL.
- The reason why such a high L/L may be provided is that the agreed value of old machinery is calculated by a calculation scheme which is recognised as relatively reasonable.

**Case 3**
Type of Insurance: Liability
Conditions:
- Cover shall include damage to items of property which are modernised during works, arising out of contract works
- L/L is set to be relatively small such as $1MIL, at largest $10MIL
- As this is liability insurance, only loss due to mal-operation by contractor is covered.

Premium: The cost of works x liability rate
Summary: Restoration costs of damaged old machinery are also covered subject to L/L.
Under standard calculation scheme of liability insurance in Japan, additional premium for coverage for such damaged property is about 30%.

**Case 4**
Type of Insurance: EAR (single project)
SI: Contract value + Agreed value of old machinery which are evaluated by contractor.
In almost all cases, rehabilitation works often shall be carried out by the contractor who installed this machinery originally. In such a case, this contractor can state the value much more easily because this machinery was manufactured by him albeit a long time ago.

Conditions:
- Old machinery which will be modernised shall be covered provided that indemnity is based on restoration cost.
- Article of underinsurance shall not be applied.
Premium: SI x normal EAR rate + an adequate loading
(Risk of old machine is relatively high; therefore, a charge of an additional 50% over normal may be appropriate)
APPENDIX II

Typical Endorsements

Example 1: for Contract Works policies:

The standard Munich Re EAR-policy provides a specific endorsement 203, which must be seen in connection with following stipulation for “Period of Cover”:

“In the case of second-hand items, the insurance hereunder shall, however, cease immediately on the commencement of the test.”

Especially where testing of pre-existing / second-hand items are re-included; this endorsement 203 may be applied:

**Endorsement 203  Exclusion Concerning Used Machinery**

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the Policy or endorsed thereon, the Insurers shall not indemnify the Insured for loss of or damage to the insured used items
- attributable to previous operation,
- attributable to dismantling (if dismantling is not covered),
- in respect of any non-metallic parts.

Example 2: for existing BI cover (Increased Costs of Working (AMKB))

German standard Clause 19c:

1. Abweichend von § 2 Nr. 2 l AMKB leistet der Versicherer Entschädigung auch für Mehrkosten infolge von Sachschäden, die in Werkstätten eingetreten sind.

2. Abweichend von § 1 Nr. 3 AMKB besteht der Versicherungsschutz auch während eines Umbaues fort.

3. Abweichend von § 2 Nr. 2 l AMKB leistet der Versicherer Entschädigung auch für Mehrkosten infolge von Sachschäden, die innerhalb der Bundesrepublik Deutschland während eines Transportes zwischen der in dem Versicherungsschein bezeichneten Betriebsstelle und einer Werkstätte eingetreten sind.

(Translation into English for information purpose only:

19 c Werkstätten; Umbau; Transporte (zu § 1 Nr. 3 AMKB und § 2 Nr. 2 l AMKB)

1. Abweichend von § 2 Nr. 2 l AMKB leistet der Versicherer Entschädigung auch für Mehrkosten infolge von Sachschäden, die in Werkstätten eingetreten sind.

2. Abweichend von § 1 Nr. 3 AMKB besteht der Versicherungsschutz auch während eines Umbaues fort.

3. Abweichend von § 2 Nr. 2 l AMKB leistet der Versicherer Entschädigung auch für Mehrkosten infolge von Sachschäden, die innerhalb der Bundesrepublik Deutschland während eines Transportes zwischen der in dem Versicherungsschein bezeichneten Betriebsstelle und einer Werkstätte eingetreten sind.

(Translation into English for information purpose only:}
19 c  Workshops; Reconstruction; Transportation (applies to § 1, No. 3 and § 2, No. 2 I AMKB)

1. Different to § 2, No. 2 I AMKB Insurers shall also indemnify increased costs of working caused by loss or damage occurring in workshops (outside the premises)

2. Different to § 1, No. 3 AMKB cover extends to works of reconstruction (of insured items)

3. Different to § 2, No. 2 I AMKB Insurers shall also indemnify increased costs of working caused by loss or damage occurring within Germany during transportation between the premises and a workshop.)

Example 3: Swiss Re clause EP43

EPI 43 Used and/or Second Hand Plant

Endorsement No. .....  

It is hereby agreed that as of the inception date of this Policy, the following Condition is added to the Special Conditions:

Notwithstanding anything contained herein to the contrary, accidental physical loss or accidental physical damage as specified in Section 1 Material Damage to used and/or second hand plant or machinery, forming part of the permanent works, is covered hereunder, provided that:

(a) cover shall only apply to such used and/or second hand plant or machinery which is refurbished where necessary, in good working condition and fit for re-use;

(b) Insurers shall neither be liable for any loss or damage due to or caused by any defects in such plant or machinery as a result of its prior operation nor for any loss or damage caused by testing or experiments whereby normal operating stresses, as originally designed for, are willingly exceeded;

(c) Insurers liability shall in no case exceed the actual value of each individual item of used and/or second hand plant or machinery;

(d) for the purpose of this Endorsement actual value shall mean the purchase price paid for the respective item plus additional costs incurred for dismantling, refurbishing (if any), transport, erection, custom duties and other dues as applicable.
APPENDIX III

Questions helping to understand the circumstances of a refurbishment job

Technical state of the plant

- What is the main reason for the refurbishment (e.g. de-bottlenecking; replacement of components with those of enhanced efficiency; end of technical lifetime; relocation to another country; new environmental legislation; de-mothballing because of resurrection of markets; shutdown of plant by order of public/statutory authority)?

- Is there an assessment of different options for the refurbishment works (feasibility studies, etc.)?

- Was the plant recently sold to a new owner?

- In case that the plant has been idle in the period before the refurbishment:
  - Were adequate standstill conservation / mothballing procedures carried out?
  - Was the plant supposed to be shut down forever or for a limited period?
  - Were there any changes in maintenance philosophy in the period before the standstill?

- What is the new design lifetime of the plant after the refurbishment? Does the new design lifetime refer to the entire plant or will components be retained, whose end of lifetime is foreseeable in near future?

- Will the plant be operated in another regime than before the refurbishment? Are there any critical implications on mechanical and thermal stresses of single components?

Evaluating the contractors capabilities

- Is the original equipment manufacturer (OEM) involved in the refurbishment process? If not: Has the non-OEM contractor references for similar jobs?
  - What is the reason (e.g. technical, economical reasons or does the OEM no longer exist?) that the OEM does not carry out the refurbishments?

- What references / expertise has the contractor for successful refurbishment jobs on identical / similar contracts?

- Is the contractor familiar with original design and operating history of the plant (e.g. because of regular service and maintenance activities)?

- Does the assembly require specific skills or technologies no longer in use (e.g. manual riveting of turbine blade shrouds)?

- What is the scope of warranties (e.g. performance; liquidated damages) the refurbishment contractor is prepared to grant to the principal?

Execution of the refurbishment

- Preparation for the refurbishment:
  - Is or has an as-built inventory been done during or prior to commencement of the
works including verification of actual dimensions and non-destructive-testing? Does the refurbishment contract make reference to those findings?

- Are there any activities planned on-site, which are normally only carried out in specialised workshops (e.g. heat treatments; difficult welding operations)?
  Note: this is not only a technical aspect, but can also influence scope of cover, if policy contains a differentiation between on-site and off-site workmanship.

- Does the site provide sufficient space for the refurbishment works?
  Do existing lifting devices (overhead travelling cranes etc) have enough capacity or must mobile cranes be used?

- Are new parts available from stocks or do they have to be manufactured for the specific job?

**Evaluating ALoP-exposure**

- Is there a formal procedure (e.g. issue of Provisional Acceptance Certificate) for the transfer of the works from the contractor to the principal?

- Is it possible to separate the potential loss of business income for the scope of the refurbishment works from the rest of the plant?

- Is there a definition of the interface between insurers of the operation and the refurbishment for the case that surrounding property not being in care, control and custody of the refurbishment contractor will be damaged?

- Will the plant be stopped during the refurbishment or will it be done in parallel to continuing operation?

- Is the total outage period determined by the schedule of the refurbishment contract works (on critical path) or by other factors?

- Is there a contingency planning (e.g. continuing using older equipment for a limited time) in case that the refurbishment job requires a longer period than anticipated?

- Are there any pending discussions with authorities regarding the necessary permits to restart operation after the refurbishment?

**Documentation**

- Can Insurers get a copy of or see existing reports (e.g. from engineering consultants or risk survey by insurers) about condition of the plant before refurbishment?

- Is there an appraisal of values of the existing plant (new replacement value or residual market value (actual value) of the plant before refurbishment?)