

PERFORMANCE-BASED MAINTENANCE PROCUREMENT BY DUTCH HOUSING ASSOCIATIONS

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Abstract

OTB Research institute has established a long-term research program to performance-based maintenance procurement in the technical management of housing stock. Stakeholders: housing associations, contractors and the Dutch Building Research Foundation are directly involved in this research program. Literature reviews, case studies, expert meetings and modelling of processes are part of our research methods.

Dutch housing associations contract out most of their maintenance work and improvements. The outsourcing and commissioning of maintenance is becoming less of a commitment to carry out specific works according to a work program, and more of a performance-based co-operation between the client and contractors.

Housing associations have developed performance-based contracts for paintwork including work to the substrates, flat roofing, lifts and central heating systems. The performance has to do with the performance of the elements during time and sometimes also to the service level, e.g. the response time and active maintenance time for breakdown service.

A breakthrough of performance-based maintenance contracts is obstructed by a lack of knowledge of clients and contractors, desired flexibility in maintenance policy by clients and their desired low market prices. In many cases the contract period is restricted to maintenance work cycles of elements. Maintenance contractors want to be kept involved in the maintenance of housing complexes during a long period, for the optimal use of their knowledge.

Keywords: maintenance; outsourcing; performance-based; procurement; technical management

INTRODUCTION

Each year, Dutch housing associations spend in excess of € 3 billion on maintenance and minor improvements, whether to the fabric of their buildings or the building services. Given the age of the housing stock, this amount is likely to increase in the years ahead. More than 90% of maintenance work is outsourced to external building contractors (Aedes 2003). The housing associations therefore have every reason to ensure that the outsourcing is properly arranged.

The growth in the size of the holdings for which an individual housing association is responsible is an important factor in considering the adoption of performance-based maintenance contracts. There are currently 552 housing associations in the Netherlands, which between them manage 2.4 million dwellings. Growth is not so much due to new construction or the purchase of dwellings, but is further to an ongoing wave of mergers. Over the past decade, the average size of a housing association's managed stock has increased to 4,600 dwellings. Some larger associations have as many as 40,000 dwellings under their management, which renders it more or less essential to explore alternative means whereby maintenance processes can be managed efficiently and effectively. With the ongoing consolidation in the branch of Dutch housing associations, their bargaining power towards maintenance companies generally increases. An additional factor is that the housing associations have chosen to re-focus on their core business, and a number now regard maintenance as a secondary process for which outsourcing, provided it is organized in a responsible manner, is preferable. Another reason for considering performance-based contracts is the emergence of a strategic housing stock policy. This entails a customer focus, greater differentiation in quality and hence some variation in maintenance performance levels (Straub 2001; Straub 2002a). The interest shown by housing associations in

performance-based agreements is also further to their adoption and development of quality management systems. Many associations have now adopted the INK (Institute of Dutch Quality) management model, comparable to the EFQM Excellence Model (EFQM 1999). While still focusing on direct results and processes, the associations wish to shift the emphasis onto continuous learning, innovation and improvement and to seek out value adding partnerships with other organisations. There is now noticeably greater attention for maintenance processes and partnership in the supply chain for maintenance.

The traditional maintenance approach entails single, detailed contracts and competition based on price, usually by means of a tender process. By contrast, the performance-based approach centres on a set of desired performances or service levels. Maintenance contractors no longer act as suppliers of capacity, but become active participants in the overall maintenance process. They assume certain risks and responsibilities with regard to the quality and costs of maintenance activities, doing so for a long period wherever possible.

The results of a survey by the Economic Institute for the Construction Industry (EIB), together with our own findings, indicate that most professional housing managers still contract out maintenance activities in the traditional manner (EIB 1998; Straub 2002b). Only three per cent of housing associations have granted fabric maintenance work under a performance-based contract. For paintwork this figure is 12%, while for installation maintenance it is 18%.

Despite the low share of performance-based contracts in the maintenance market, clients and contractors are able to cite a number of advantages attaching to a performance-based approach (Straub 2002b). Clients emphasise the reduction of financial risks at the longer term and steering the maintenance processes on main points. Contractors underline improvements of performance and service and innovations in the whole maintenance process by having continuity in orders and sustainable relationships with clients. They have a common interest in developing performance-based concepts and suitable instruments for performance measurement.

ONGOING RESEARCH

This paper is largely based on two ongoing studies being conducted by the OTB Research Institute for Housing, Urban and Mobility Studies at Delft University of Technology. The first study is into performance-based agreements for several building components and organization's maintenance activities and involves seven large, innovative housing associations and the Dutch Building Research Foundation (SBR). The housing associations involved in the study have entered into performance-based contracts with maintenance companies. The second, parallel, study is into performance-based approaches and involves input from contractors specializing in exterior surfaces, again with the participation of the SBR. Both studies hope to promote mutual learning and to establish guidelines for performance-based maintenance concepts. The first phase involved literature reviews and case studies, together with an analysis of the housing associations' current procurement and outsourcing methods. Performance-based agreements covering the maintenance of central heating systems and lifts, flat roofing and paintwork have been examined and compared. Then, in 2003, various processes were modelled and expert meetings were organized at which housing associations and contractors were invited to discuss the interim results. In 2004, performance-based approaches for various building components will be further elaborated, and the Dutch situation with regard to innovative performance-based concepts will be compared to that in other countries, and that current in the refurbishment and new-build sector. There has been considerable prior research into the performance-based concept in new construction (e.g. Pries 1997). The results of our study indicate that the preconditions that exist here also apply for the most part to maintenance and improvement work. The final component of the study will examine how effectiveness and efficiency can be enhanced throughout the maintenance supply chain.

The housing associations consulted during the current study state that the reduction of financial risks and improvement of quality must be seen as paramount. Fulfilling the needs of final customers (the tenants) is also important, but not a leading objective. They emphasize new approaches whereby their maintenance processes can be managed effectively and efficiently. They are aware that procurement of maintenance is not just an operational activity, but involves tactical and strategic decisions about outsourcing and differentiation questions. The outcome of the research may assist in discussions around the transition of the building sector from a one-dimensional orientation on costs, to process and value maximization.

WHICH BUILDING COMPONENTS?

The development and use of performance-based agreements will depend on the type of maintenance involved, the costs as a proportion of overall maintenance expenditure, and the opportunities that exist to measure both performance and the level of risk faced by the client. Maintenance contractors are prepared to assume certain risks, but at a price. In the case of performance-based agreements for separate building components, a preventive and/or condition-based maintenance approach forms the basis of all maintenance activities. However, this does not mean that the agreements should not also cover breakdown services by comprehensive contracts, such as those to which flat roofing and various installations. Preventive cyclical maintenance and breakdown service lend themselves particularly well to the performance-based approach. In case of preventive cyclical maintenance regular, fixed contact moments between client and contractor already exist. Preventive activities are carried out to preclude breakdown of the system. Performing breakdown service is not so much a question of performance level of the installation components, but that of the technical service levels, i.e. response time and active maintenance time. Some of the performance requirements can be derived from the requirements of the client's own quality management systems, put in place to ensure customer satisfaction. Indeed, the customers themselves have a part to play in monitoring compliance with such requirements.

Paintwork

Paintwork, with the necessary work to the substrates, accounts for over one third of housing associations' current maintenance expenditure. It is therefore not surprising that the associations should seek new methods of contracting out such work in order to render the procurement process itself more efficient, while also maintaining the ability to control performance on a sustainable basis. The contractors involved in the current study have adapted their working methods accordingly. Most performance requirements involve product performance, e.g. cracking of substrates and degree of blistering of paints.. Both clients and contractors acknowledge that the current high degree of detail of performance requirements is a matter for further attention. Not all possible occurring defects have to be used in performance-based contracts (Straub 2002b). The extensive quantity of requirements indicates that there is insufficient trust, confidence and knowledge available to reduce the number of firm requirements. Clients in particular expect that future agreements will contain far fewer detailed specifications and will rely more on functional requirements. Our ongoing research involves indicative performance criteria deduced from functional requirements for painted building components.

Flat roofing

The housing associations require certainty with regard to the life span of flat roofing and its performance over the long term. Normally, manufactures guarantee the well functioning of their roofing products for 10-15 years, if certified contractors do maintenance. In the case of performance-based agreements for flat roofing, it is clearly appropriate that the responsibility for providing a guarantee on well functioning comes to rest with the maintenance contractor, rather than the manufacturer. Just one of the housing associations has entered into a performance-based agreement with a roofing company, which has in turn entered into a contract with the supplier of the roofing product used.

Central heating systems

In the case of maintenance to central heating systems, the housing association company union Aedes published a model performance agreement in 1998 (Aedes 1998). Individual associations have since produced their own versions of this agreement, sometimes going even further than the 'standard'. Safety requirements play an important role in shifting responsibilities for maintenance activities to contractors. Response times and active maintenance times are the most important performance requirements. One of the housing associations involved in the study has gone so far as contract out all improvements to, and replacements of, central heating systems over the long term. This association simply demands that its residents should have hot water and heating. How this is achieved is not seen as important, as long as it is indeed achieved. Another housing associations wished to have mechanical ventilation systems included in the performance agreements for central heating systems. But, dwelling types, construction years and the habits of the tenants have a major influence on the circulation of fresh air. As yet, it has not

proven possible to establish responsibilities and risks of client and contractor in this regard in any responsible manner.

Lifts

The housing associations emphasize the cost savings and additional performance quality that can be achieved through the introduction of new agreements for lift maintenance. There is currently some general dissatisfaction regarding the performance of lift maintenance contractors. By passing greater responsibility to the contractors themselves, costs can be reduced considerably. Existing maintenance contracts are based on a fixed number of call-outs per year. However, not all lifts require the same amount of maintenance in a year. This will depend on factors such as the type of lift and the intensity of its use. Eventually, they wish to achieve a clear, uniform maintenance approach, with fewer parties involved, and fewer different types of lifts in use. Moreover, those lifts should be of better quality. This is prompted in part by the Safety rules for the construction and installation of existing lifts (CEN 2003), following the European Recommendations (95/216/EC) and the European directive to new lifts (European Council 1995).

DEVELOPMENT PHASES OF PERFORMANCE-BASED PARTNERSHIP FORMS

Despite the fact that model agreements exist for many years, the development of performance-based maintenance agreements is still in its early stages. Progress varies greatly according to the type of maintenance concerned. Both the housing associations and the contractors are striving to achieve continuity of work, improved quality, direct and indirect cost savings, greater certainty with regard to maintenance costs in the long term, optimum process management, and the measurability of performance. In general, the development phases which may now be identified can be described as: (1) the traditional contracting-out (by tender) of maintenance activities; (2) price and performance agreements for maintenance activities and (3) long-term cooperation for maintenance. See Figure 1.

1 Traditional contracting-out (by tender) of maintenance activities
• Detailed description or specification of work to be performed • Procurement by means of competitive tender • The role of the maintenance contractor is limited to the actual work • The objective is to achieve the lowest price or best price-quality ratio
2 Price and performance agreements for maintenance activities
• Performance agreement based on standard activities and unit prices • Cooperation with a selected group of maintenance contractors • Contract is valid for one or two maintenance intervals • The maintenance contractor contributes to the planning process • The objectives are improved quality, direct cost reductions, budgetary certainty and the development of sustainable relationships
3 Long-term cooperation for maintenance
• Performance-based contract with agreements covering price and performance for the long term. • Cooperation with a selected group of maintenance contractors • Financial risks laid down by maintenance contractors • The contract duration is until the end of the desired operational life span of the housing complex or several maintenance intervals • The role of the maintenance contractor is that of advisor • Objectives are to match quality to the principles of organizational policy, to allow the client to manage the main outline of the process, to improve the process, to achieve indirect cost savings and to promote innovation on the part of maintenance contractors

Figure 1: Development phases of performance-based partnership forms

All the housing associations participating in this study are following the same development path with regard to performance-based maintenance agreements. However, they have reached various stages of development. There are also differences with regard to the individual associations' approach to each of the various types of maintenance, depending on the organizational structure, size and general policy. Many of the performance agreements to date are notable for their inclusion of price and performance agreements between a housing association and one or more contractors. Most are of limited duration. Eventually, the housing associations intend to achieve more long-term forms of cooperation. In that case contractors are consulted at an early stage of the process, and are therefore able to contribute their ideas concerning the best maintenance strategy within the constraints of the quality requirements, the expected life span, and the financial aspects applying to each housing complex. However, it is important to acknowledge that the client organization's objectives are likely to change over time and external circumstances may change. Therefore any long-term cooperation must incorporate a degree of flexibility.

THE PERFORMANCE-BASED PROCUREMENT PROCESS

Figure 2 presents the six phases of the performance-based procurement process for maintenance, based upon the purchasing process model of Van Weele (2002). The first three phases are called tactical purchasing. Phase 1 (specify) relates to the formulation of the Programme of Requirements for maintenance, according to the type of maintenance or the building components concerned. This Programme of Requirements will set out the general objectives, guiding principles and preconditions for the envisaged partnership form, as well as the functional requirements for the maintenance activities. Based on the Programme of Requirements, contractors are selected in phase 2. A general contract is then entered into with one or more of these contractors in phase 3. This will set out standard activities and unit prices, which will then be used as a basis for the performance-based contracts for each project in phase 4. Phase 3 may be said to include the formulation of performance indicators insofar as these are derived directly from the Programme of Requirements. This is a joint undertaking by both client and contractor. The performance indicators for individual projects are elaborated to form performance requirements (with a clear norm) in phase 4. The client will monitor compliance with the agreements by means of periodic performance measurements in phase 5. Finally, Phase 6 (after-care) involves the evaluation of the process undertaken together with the maintenance contractors, whereupon the contracts will be revised and/or prolonged as appropriate.

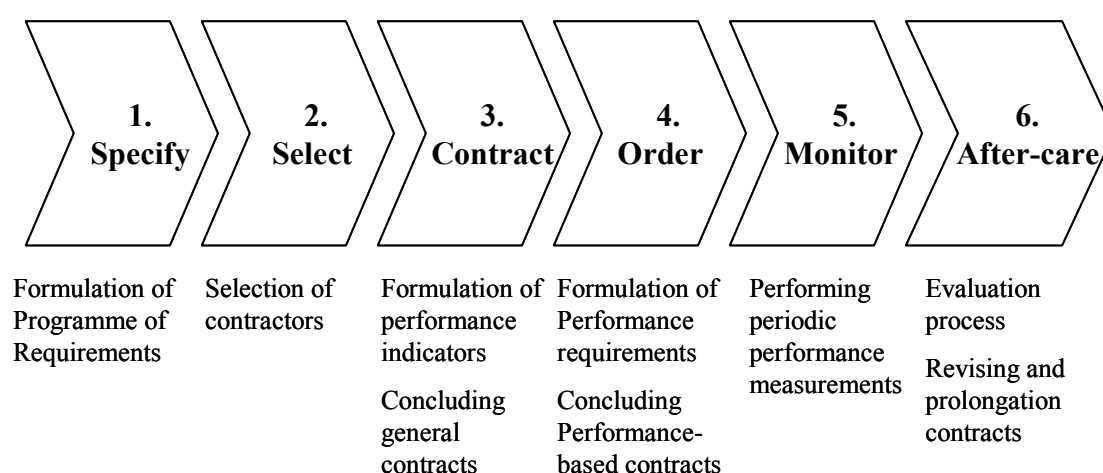


Figure 2: Performance-based maintenance procurement process

Process for performance-based planned maintenance

In practice, the performance-based procurement process is not exactly a copy of figure 2. Determining factors are the type of maintenance and the building component covered by the performance-based contract, and the legally binding agreements by which the client and contractor are obliged to observe the performance requirements. Having studied and analysed existing contracts, we have further elaborated this model to cover the planned maintenance

management process. Figure 3 presents an idealized process model for performance-based planned maintenance. The figure shows just the technical management process.

The responsibilities of the client are (shaded in the figure):

- definition of maintenance projects;
- establishment of quality levels for maintenance projects;
- determination of available budgets for maintenance (and improvements);
- tactical purchasing and ordering of maintenance (see the first four phases of figure 2), resulting in a general contract and/or performance-based contracts, together with price and performance agreements;
- the selection of an appropriate maintenance scenario.

The contractor's responsibilities are:

- inventory and inspection ('zero situation');
- planning and budgeting maintenance activities, the production of maintenance scenarios and a schedule of activities based on the client's requirements and conditions;
- actual execution of the maintenance work (first activity plan of the selected maintenance scenario).

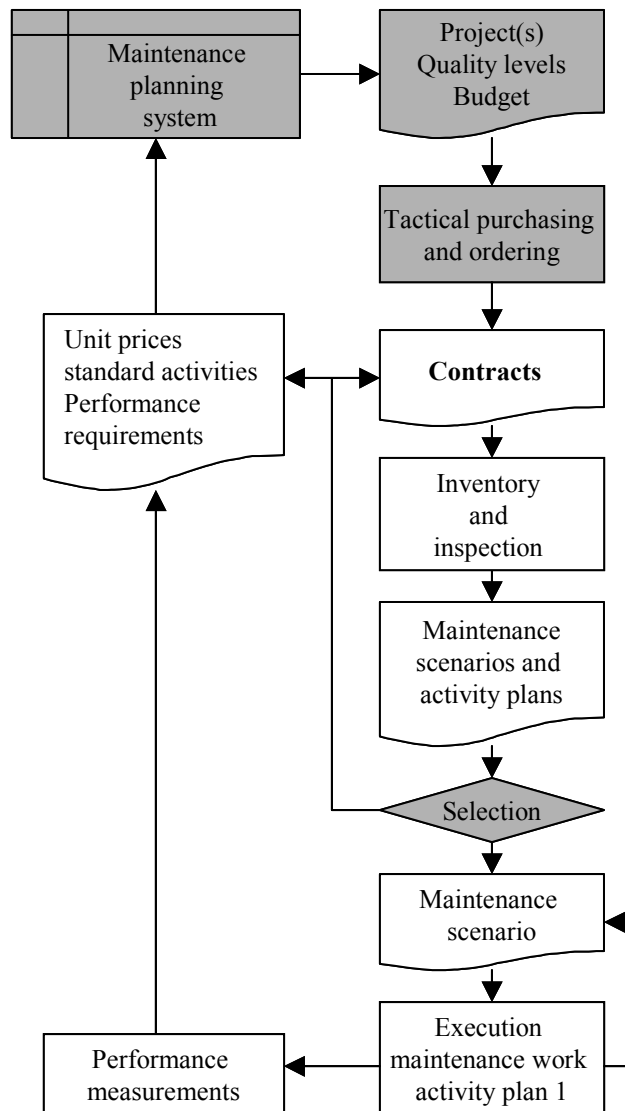


Figure 3: Performance-based planned maintenance management process

As shown in the figure the client and contractor often liaise with regard to the maintenance scenario and planning of activities and any subsequent modifications to the schedule. Performance measurements, conducted by the client, contractor and/or a third party consultant will enable the client to ascertain whether the contractor has met the stated requirements. Having entered into agreements, there is a 'one on one' relationship between the client and the contractor throughout the term of the contract. The maintenance contractor must report the maintenance activities conducted and the performance levels attained directly to the client during the entire period. Using information derived from inspections or performance measurements, the client can update his maintenance planning.

CONTRACTUAL ARRANGEMENTS

In our ongoing research we focus on technical arrangements of performance-based contracts. Besides, commercial, organisational and legal arrangements differ from those in traditional maintenance contracts. The performance-based contracts in our study are based upon a fixed price, allowing them to recover additional costs caused by agreed circumstances.

Contract period

Housing associations and maintenance contractors agree that performance-based agreements will be most useful and appropriate if they are long-term in nature. Continuity enables the product and services to be offered at the best level of quality. However, this does not necessarily mean that the agreements should be legally binding for long periods. It must remain possible for the parties to "go their separate ways" should this prove necessary. Nevertheless, there must be a letter of intention to continue the partnership throughout the term of the contract. In order to observe and measure the effects of performance-based arrangements, the ideal situation is to have one contractor perform the maintenance on a building complex for the entire operational life span of the building.

Performance requirements and performance measurement

There should be no room for disagreement between client, maintenance contractor and any external consultant with regard to the measurement of performance or the definition of a building component. Clear and unequivocal agreements are essential. The maintenance of building components often involves several contractors, whereupon it falls to the client to determine the performance measurement method to be used. The contractors themselves should, where possible, monitor the degradation processes by performing performance measurements, further to the agreed performance levels. Performance control by independent third parties, may take the form of a random check rather than a full inspection of every product performance indicator. In the Netherlands most of the performance-based-contracts for paintwork can be characterised as prices and performance agreements for maintenance activities. See figure 1. Performance control is carried out after the execution of initial activities and maintenance work cycles (final acceptance control), at specific intervals (periodic performance measurements) and at the end of the contract period. The final acceptance control involves an examination of performance directly related to the quality of the workmanship.

IMPLEMENTING PERFORMANCE-BASED MAINTENANCE PROCUREMENT

Performance-based maintenance procurement influences the internal organisation of both client as contractor, the selection of contractors and their responsibilities and the appropriate tools and information.

The client organization

In the traditional organization structure, responsibility for procuring maintenance work often falls to the staff of a technical department of the housing association, such as the maintenance project managers. Frequently, a fixed small group of maintenance contractors will be involved, working to a basic standard specification. In fact, this is more a case of 'ordering' maintenance work. By contrast, 'procurement' implies that the choice of maintenance contractors is made at a tactical level within the organization, perhaps within a central procurement department. The selection and evaluation of contractors can be made at this level, based on purely objective criteria. The housing associations participating in this OTB study acknowledge the importance of

an intelligent client role. They realize that they will in future require people with different skills: fewer hands-on technicians and more maintenance process managers, being people with a thorough knowledge of procurement, legal issues and access to high-level technical expertise (even if this has to be brought in from elsewhere). The financial mandate to enter into long-term agreements is probably greater within a procurement department than on the operational level. Moreover, a central department is also likely to have access to the necessary legal expertise.

Selection, assessment and organization of contractors

Within the performance-based procurement system, the selection of maintenance contractors with whom the client wishes to work is extremely important. A housing association performs an appraisal of business risks based on information that allow them quickly to predict a contractor's risk of success or bankruptcy. Besides, the housing associations currently use selection and assessment documents which they have developed themselves and which enable maintenance contractors to be selected objectively and systematically. A positive development in this regard is that maintenance sector organizations are now working on their own system of quality assurance, with a certification system for affiliated members. An example is the development of a scan for performance-based competences of maintenance companies (Hoofdbedrijfschap Afbouw en Onderhoud 2003). Maintenance companies must be able to define and achieve the various performance levels for each type of maintenance and building components. Moreover, the contractors must be able to present and substantiate the (financial) risks attaching to the various maintenance scenarios. For example, they must be able to assess whether the likelihood of damage recurring, or damage being caused to other parts of the fabric, will increase given certain methods of carrying out the planned maintenance work. The financial risks attaching to unforeseen events must be shared between the client and contractor.

Here, it is important that not only the management of the maintenance companies know the implications of such a system, but that the operational staff are also aware exactly what the new working method entails. This applies equally to the clients, among whom we have noticed some disparity between the intentions and practices of management and the manner in which the maintenance project managers wish to work. The traditional manner of thinking and working, with its focus on incidental maintenance interventions, is not simple to abandon in favour of one based on performance requirements. Difficulties in doing so are similar with training building inspectors performing condition surveys (Straub 2003).

Responsibilities and risks

Working according to the performance-based principle entails a shift of responsibilities between the parties as well as a shift of risks. The companies that agree to assume greater risks will charge higher prices. In other words, it costs money to buy off one's risks. However, because responsibilities are also transferred, the maintenance contractors are in a better position to manage the risks.

In the performance-based agreements examined within this study, there is little evidence of financial risks being transferred to the maintenance contractors. The performance-based agreements are of relatively short duration and rely on predetermined performance requirements levels as well as to success or failure in meeting the agreed life expectancy of, say, external paintwork or central heating boilers. Hereupon financial claims are possible, based on penalty clauses. The standpoints of the housing associations with regard to imposing penalties vary significantly. In fact, financial penalties are rare in practice. A penalty is more likely to take the form of a cancelled contract. Most agreements relate to 'short cycle maintenance' and generally do not include major maintenance interventions such as the replacement of building components, which are to be charged separately. Their development phase can be characterised as 2 in figure 1. If the agreements were to be of longer duration, and were indeed to include replacement of building components the contractors would indeed bear more responsibility and greater financial risk. Incentives for better performance are a prolongation or enlarging of contracts.

Information provision

In the case of performance-based agreements relating to specific building components, the contractors must report the activities carried out, the condition of the component in question, and the level of service achieved in terms of response and active maintenance times. The report should be presented in the form requested by the client. The desired exchange of information between clients, contractors and consultants will probably require some modification to existing information systems. Historical data concerning maintenance costs is important in developing

performance-based agreements and in evaluating the tender bids received. An insight into past costs and the performance of building components and maintenance types, and hence the registration of such information, is important when entering into long-term performance-based maintenance agreements.

RESULTS AND DISCUSSION

A breakthrough of performance-based maintenance contracts is obstructed by a lack of knowledge of clients and contractors and distrust. Confidence in each other's working methods is clearly of prime importance.

A long-term partnership will enable both clients and contractors to derive the greatest possible advantage from the performance-based maintenance approach. Dutch housing associations fear a disturbance of price competition using long-term performance-based contracts. Together with their desired flexibility in maintenance policy they restrict the co-operation period to maintenance work cycles of elements. Continuity of work must never be the main objective of the contractor, since this could lead to lassitude. Long-term cooperation with the client must be accompanied by improvements to process and performance, and by cost savings for client and contractor alike. Clients and contractors should be aware that realization of each other's objectives depends more on the process and the manner of working than on the type and duration of the legal contract. Based on the client's starting position, the intended quality level, specific project characteristics and an assessment of the risks, the choice of cooperative structure and contract form can be made with the interests of each party in mind.

Maintenance contractors can match their knowledge of degradation processes, condition-based maintenance and the practical activities involved to the circumstances of each project, such as location and usage, and to the principles and conditions applied by the client. In doing so, they must also make use of the knowledge of suppliers of products and materials. Performance monitoring can take the form of 'self control', as part of the contractors internal quality management system, with occasional random checks by a third party.

The development of performance-based maintenance agreements is, given the financial interests involved, most advanced in the case of fabric maintenance, and in particular for exterior paintwork on various substrates. Clients and contractors require guidelines for an effective, efficient and transparent performance-based procurement system for fabric maintenance. OTB Research Institute is now working alongside the parties concerned in developing appropriate guidelines, with a focus on exterior paintwork on wood, brick, metals and plastics. For the propose content of the contract we follow the elements listed in the European pre-standard ENV 13269 (European Committee for Standardization 2001) The extent to which the working processes can be standardized must now be examined. The guidelines will differ according to the objectives of the parties involved and development phase of the client.

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