PREVENTIVE METHODS TO REDUCE THE DETERIORATION OF MONUMENTS AND OUTDOOR ART BY THE MICROBE BURDEN OF THE SOLID-MICRO-DUST-FRACTION

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Atmospheric load of chemicals as destructive agents to historical and artistic buildings is known well, accepted and usually described. The interaction of those pollutants with the surface of these monuments is a physical – chemical process regulated by parameters you can measure. The process itself is a local "passive" event and very dependent on the concentration of the substances involved.

The micro-dust-fraction (< 10 µm PM.^{10}) and its load with microbes is in its interaction with contact-surfaces a partly passive event only. Consecutively it becomes an active process due to microbes activity. The destruction caused by the "airborne" agents then is a long lasting self-perpetuating active process.

The research work is focused on new methods to evaluate the ability of protective measurements. The test systems developed assess how the chemical or physical protective measurements will successfully prevent the destruction caused by microbes, be neutral or can even cause an adverse effect. The testing-system itself can be modified easily and take into account the composition of the material of the piece of art itself and the chemical composition of the protective agent. The probability of an adverse effect becomes predictable and a cost and time consuming bad experience later on may be avoided.

Another important question can be answered by the possibility to pre-test the aging effect on the substances used and the changing of their protective capacity. (Prof. DI Dr. Stark)

As far a as the results show up to now it will be possible to show metabolic turn over (material aggressive component) and replication rates simultaneously under various conditions. The influence of differentions on the DNA fraction rate in the aggressive microbes, the role of sulfur and carbonhydrates and the chelats built and their role to interact

with the microbes repair mechanisms are steering factors for the active aggression and the invasion into the material of monuments and pieces of art.

As a side effect of the research work the methods under development have already proved their ability in adopting and optimising the biological stabilisation of industrial process water by successful pre-testing various simulated conditions (VOEST ALPINE AUSTRIA). The results gained have led to changes of the process and the chemical compounds used.

The project to develop a test – system to judge the ability of measurements and materials used in restoration and conservation of pieces of art to protect them against the attack of invasive and destructive micro organisms will be finalized by end of September 2003 and the results achieved will be submitted to this Journal.

Key Words

Micro-Solid-Aerosol; airborne microbiological contamination; invasive destruction by microbes; environment simulation; aging of substances used for conservation or restoring.

Note

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Riassunto

Lo scopo della ricerca è di confrontate l'efficacia di trattamenti di conservazione e restauro in condizioni ambientali diverse, al fine di testare le misure protettive prima di adottarle nella pratica. Gli effetti di un intervento che restituisca colore ad una superficie o che ne aumenti la capacità di riflessione, ad esempio, possono diventare disastrosi se i microrganismi presenti sulla superficie ne traessero beneficio. L'idea è perciò quella di sviluppare un sistema di test per la valutazione delle misure protettive in diverse condizioni ambientali simultaneamente.

Abstract

To compare the various restorative measurements under competitive environment simulation, may become a major challenge to the concepts to preserve the pieces of the world heritage. Test the ability of the protective measurement before putting it into practice. The primary effects as e. g. a cover, a refreshing of the colour, or an improved light reflection can lead to a disaster if the active acting world of microbes gets support by that action. The way out is to implement test-systems in advance,

able to judge the protective measurement under different defined conditions simultaneously.

Résumé

Le but de cette recherche est celui de confronter l'efficace de traitements de conservation et de restauration dans des conditions environnementales différentes pour tester les mesures protectives avant de les utiliser en pratique. Les effets d'une intervention, qui redonne la couleur à une surface ou qui augmente la capacité de réflexion, par exemple, peuvent devenir désastreux si les microorganismes présents sur la surface en profitent. L'idée est donc celle de développer un système de test pour évaluer les mesures protectives dans des conditions environnementales différentes.

Zusammenfassung

Das Ziel der Forschung ist der Vergleich der Wirksamkeit der Erhaltungs- und Restaurierungsbehandlungen bei unterschiedlichen Umweltbedingungen, um die Schutzmaßnahmen vor ihrer Anwendung in der Praxis zu testen. Die Auswirkungen eines Eingriffs, um beispielsweise einer Oberfläche ihre Farbe wiederzugeben oder ihre Reflexionskapazität zu erhöhen, könnte katastrophal sein, wenn die auf der Oberfläche vorhandenen Mikroorganismen daraus Vorteile ziehen könnten. Der Plan ist daher die Entwicklung eines Testsystems zur Bewertung der Schutzmaßnahmen unter unterschiedlichen simulierten Umweltbedingungen.

Resumen

El objetivo de la investigación es el de confrontar la eficacia de los tratamientos de conservación y de restauración en condiciones ambientales diferentes, con la finalidad de probar las medidas de protección antes de adoptarlas en la práctica. Los efectos de una actuación que devuelva el color a una superficie o que aumente la capacidad de reflexión, por ejemplo, pueden llegar a se desastrosos si microorganismos presentes en la superficie se llegaran a beneficiar. La idea es por tanto la de desarrollar un sistema de test para la evaluación de las medidas de protección en diferentes condiciones ambientales simultáneamente.

резюме

Целью исследования является сравнение эффективности приемов по сохранности и реставрации в различных условиях окружающей среды для тестирования защитных мер перед их применением на практике. Эффекты операций по восстановлению цвета поверхности или по повышению ее способности отражения, например, могут стать катострофическими, если микроорганизмы, присутствующие на поверхности, нашли благоприятную почву. Идея поэтому сводится к следующему: развитие системы тестов, направленных на оценку защитных мер в различных условиях окружающей среды одновременно.