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No more long distances: the new building for dosimetry in Dortmund.



Ground-breaking ceremony in Erwitte for the new testing hall – from left to right: Jens-Peter Steuck, company manager, graduate engineer Tanja Friedrich, engineer of the fire testing centre Erwitte, graduate engineer Dieter Goedecker, head of the department Building Security.

Ground-breaking ceremony

■ ■ ■ The MPA NRW is investing in the future: The department for dosimetry and the fire testing centre receive new buildings

The department for personal dosimetry, so far has been located in four different buildings, has now moved into its new building at the end of last year: “Long distances are over now as well as the lack of communication possibilities between the staff members”, says Dr. Frank Busch, head of department and head of the personal dosimetry service. “The location situation so far made processes complicated. The new building is now adepted to our needs and thus also facilitates future improvements of organisational and technical processes.” The new building has two floors, and with a total area of 1,600 square metres also offers room for a dosimeter dispatch line that will be completed in the beginning of 2015. This line enables the automatic dispatch of dosimeters with a customer-friendly packaging which allows an easy return.

The two departments – radiation protection and dosimetry are optimising their customer relations: Under the slogan “Many services, bundled competence” the “competence centre radiation protection” offers its customers a wide range of specialist solutions (page 3 to 6). “Of course, our competence centre has not changed the familiar structures of both departments. Our experts are still glad to assist customers having requests or inquiries”, explains Dr. Axel Rox, head of the department radiation protection and radioactivity measurement.

The MPA NRW is also investing in its future in Erwitte: The department “Fire resistance of building components” will now have more space for its testing services. The ground-breaking ceremony took place on 19 November 2014. After the completion of the new testing hall

the testing services of natural smoke and heat exhaust ventilators will be enlarged by long-term performance tests and functional tests under load. The department “Reaction to fire behaviour of building products” will also benefit from the new hall and move into additional rooms for the sample preparation for the Single-Burning-Item-Test.

“The new buildings are an important part of our strategic future planning”, says the company manager Jens-Peter Steuck. Furthermore, by moving the dosimetry into the new building on 1 January 2015, large parts of the real estate in Dortmund can be used otherwise by the federal state of North Rhine-Westphalia.



Minimising error sources

■ ■ ■ MPA NRW employee Alexander Kutz was awarded a prize for his improvement suggestion.

Until now damaged dosimeter films in the darkroom could not be removed after being "taped", i. e. glued together to a long strip. The result often was a faulty development. The suggestion of Alexander Kutz comprises the construction of a magazing device for evaluating sent-in dosimeter films. "In my device the films can now be re-magazined. This can be done in daylight during the inspection on entry", explains the employee of department 12. "Now when handling sent-in dosimeters, defects can be recognised at an early stage and in normal day light before disturbing darkroom operations."

Scanning barcodes simultaneously with the films creates an additional control point which prevents films getting lost unnoticed in the fully automatically operated darkroom.



Alexander Kutz (on the right) explains his improvement suggestion to Torsten Burmester, head of the central department of the NRW Ministry of Economics

For his improvement suggestion resulting in a considerable quality improvement in the processing of dosimeters, Alexander Kutz received a certificate by the NRW Ministry of Economics during an award ceremony as well as a bonus.

Four thousand fire tests

■ ■ ■ On 18 July 2014 the 4000th fire test was conducted in the fire testing centre Erwitte.

The function integrity of cables was to be tested. This is an extensive construction review. Large components are set on fire in the furnaces of the department "Fire resistance of building components" for test purposes, i.a. glass constructions, door and fire protection closures, pipe and cable penetrations, penetration seal systems, smoke and heat exhaust ventilators. These large scale fire tests are accurately entered in the fire journal and individually numbered.



Fire tests have been conducted at the MPA NRW for over 50 years – in the fire testing centre Erwitte for over 25 years.

■ ■ ■ | Forum Hardness

The "Forum Hardness" will once again take place at the MPA NRW from 25 till 26 February 2015. One of the subjects will be innovations in the standardisation of the hardness tests. For example, the DIN EN ISO standards (for Brinell, Vickers, Rockwell) have been revised. Other subjects will be periodic checking and measuring inaccuracies, the re-evaluation of hardness values, the suitability of measuring instruments, and portable hardness tests.

■ ■ ■ | Quality and materials testing NRW

On the specialised fair "Quality and materials testing NRW 2014" taking place on 24 and 25 September 2014 in Muelheim/Ruhr the MPA NRW informed its customers from the metallurgical and metalworking industries about current hardness topics. In his technical lecture the graduate engineer Wolfram Schiffer from the department calibration laboratories, hardness reference blocks and indenters spoke about the "Amendments and implementation of new hardness testing standards".

■ ■ ■ | EGOLF Training Courses

Also in 2015 the MPA NRW will offer EGOLF training courses for European harmonised fire test procedures. They refer to the test procedures concerning the reaction to fire behaviour of building products according to the standards DIN EN ISO 1182, DIN EN ISO 1716, DIN EN ISO 11925-2, DIN EN ISO 9239-1 or DIN EN 13823 (SBI test). These events create a basis for a uniform approach when conducting the tests and evaluating the test results.

Further information:

www.mpanrw.de/aktuelles

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Bundled competency in the competence centre: Dr. Frank Busch and Dr. Axel Rox

A closer link

■ ■ ■ In their new competence centre the departments dosimetry and radiation protection will be even more customer-friendly.

It is one of the lengthiest individual orders of the MPA NRW: since summer 1995 the department radiation protection has been involved in the decommissioning of the nuclear power plant Würgassen at the river Weser. The radiation protection experts from Dortmund work there on behalf of the supervisory authority. "Our job is to supervise the companies participating in the decommissioning work: In the course of this we have to ascertain if the decontamination measures worked out by us and another expert

before the beginning of decommissioning are expedient", explains Dr. Axel Rox. The head of the department radiation protection and his staff members check all materials that leave the premises of the power plant. "We check whether the operations are suitable to comply with the regulations of the supervisory authority." This means the recyclability of the material, respectively its previous decontamination. In the end, only two per cent of the 255,000 tons of decommissioning mass are left to be disposed of in a controlled manner as nuclear waste.

However, the works on site also imply a physical effort for the experts of the

MPA NRW: "We have to reach even the most remote surfaces in the now gutted large rooms in order to control the success-

Verification measurements on decontaminated building surfaces – for instance at the nuclear power plant Würgassen

ful decontamination with our own measurements", explains Dr. Michael Nusshardt. At the end of each individual measurement the graduate physicist and his team check the mandatory result reports of the executing company.

By now the works have reached the final stage. Due to the nuclear phase-out an interesting market has developed for the radiation protection team. The works in Würgassen may open the door for further orders, for example for the planned decommissioning of the research reactor in Jülich. "Only those companies are commissioned that have extensive competence and experience in all aspects of dosimetry and radiation protection", says Axel Rox, describing the high demands.

Many issues of common interest

By creating the competence centre the MPA NRW has now linked the departments dosimetry and radiation protection closer together. This is customer-friendly and consequent. Because there are so many issues of common interest as well as customers – for instance the operators of nuclear plants: The department dosimetry equips the staff with personal dosimeters, and the department radiation protection monitors the surrounding area. The same applies to the radioactive inert gas radon which can pass through the layers of the earth and enter into areas where people dwell: The department radiation protection carries out the long-term measurements for example in cellars of residential houses, and dosimetry analyses the dosimeters of the employees of the hard coal mining industry or show caves.

The MPA NRW is a notified monitoring service for the federal states North Rhine-Westphalia and Lower



Saxony and could have more dealings with this inert gas in the future, says Axel Rox. "The EU countries have to put the EU basic standard for radiation protection into valid law until 2018. Then most probably radiation limits or standard values will exist for radon. This may result in a higher demand of radon measurements."

Capacities also for unfrequent questions

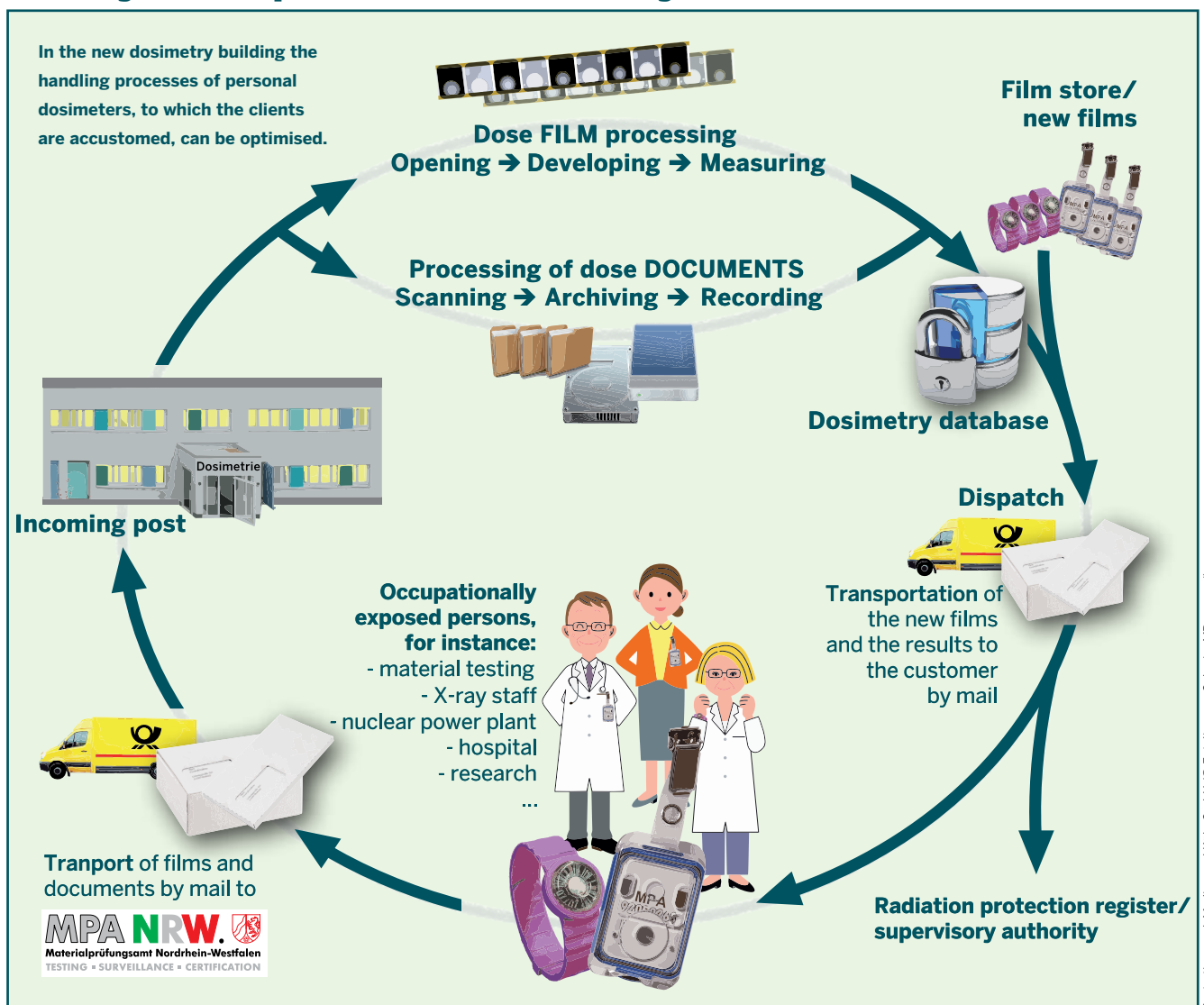
The tasks of the MPA NRW with regard to the application of X-ray systems and accelerators in the non-destructive testing or in medicine are

increasing. "Our experts who regularly check and certify the safety and the functions of these devices are often asked by the operators whether we can furnish a constructional opinion for the new design of such devices", explains Michael Nusshardt. These are demanded by the regulating authorities and give the architects the answer to the question how thick the protective walls in the building have to be. Also after the shutdown of these accelerators the department radiation protection of the MPA NRW is still involved: they have to be removed in a controlled manner.

"We cover all spheres regarding dosimetry and radiation protection, and our customers know this", says Axel Rox. The MPA NRW even has capacities in its radiochemical laboratory for unfrequent questions or orders: "Should for example an analysis for special nuclides be required, then we can handle it with the same reliability as any other order."

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The cycle of personal dosimetry



Short distances in dosimetry

■ ■ ■ The new dosimetry building simplifies our processes, says Dr. Frank Busch, head of the personal dosimetry service, in an interview

In December the dosimetry service moved into its new rooms. What will change in the new building?

So far the staff was spread over different buildings. Therefore the distances of the employees were long, coordination often had to be done by telephone. The new building meets the demands of dosimetry.

What does that mean?

The structural concept is now optimally geared to our needs. The distances for the staff members are short so that they communicate personally and directly on technical issues. The heart of the building is the darkroom. All other departments group around this one.



Isn't a darkroom redundant in the digital age?

Certainly not! We would like to offer this proven technology in the sphere of personal dosimetry for at least a further decade. The films provide us with instructive pictures: There are different element layers in the cassette. After development the kind of image on the film admits a conclusion concerning the specific use of the dosimeter: Did radiation come from the side, from the front or even from behind? The film dosimeter even gives us information when it has been hanging on the white coat on the wardrobe in the X-ray room for

a longer time and hasn't been worn. However, the other dosimeters only give us figures, which means dose values. These are used in passive dosimetry when the film dosimeters reach their limits – for instance on medical staff at accelerators used in the tumor treatment.

And when the dosimeter films can no longer be delivered by the manufacturer?

For this we are well prepared. In parallel we are working on the development of an alternative technology in passive dosimetry. We have developed the so-called TL-DOS-System on the basis of the TLD-procedure and adapted it to fit perfectly to our needs.

What is the state of development concerning the active dosimeters?

Active dosimeters indicate directly how much radiation is occurring and warn in the case of high values. The problem is their use with pulsed radiation. This radiation constantly changes its intensity. It has so far not succeeded to develop active digital dosimeters in such a way that they reliably register and indicate this. Therefore they have not yet been officially approved. The great advantage of active dosimeters is that they are not worn by only one person but can be passed on at change of shifts. The measurement results of each shift are digitally transmitted to the dosimetry service in intervals which are to be agreed. In this case data protection issues have to be observed, because on the one side dose profiles are to be determined without determining the work profile of the employee: When is who where and for



Electronic dosimeters and film dosimeters

how long? From the point of view of the works council and the staff council this would go too far, as they see the data protection of the employees at risk. Of course, this clashes with the interest of a gapless evaluation of the radiation intensity: When did the dose develop and with whom?

What will change at the MPA NRW in the digital dosimetry age?

... our processes. So far the dosimeter films are returned to us by the customers once a month by post. Our evaluations are sent back to them with the new films. Other mail goes to the supervisory authority. Already today the data are securely and digitally transferred to the radiation protection register of the Federal Office for Radiation Protection. In future further processes as well as communication will function digitally. We are therefore planning a client dosimetry portal into which our customers can log in and see their data or change their orders.



The MPA NRW is momentarily developing a passive dosimeter system



Control measurements in the area of nuclear plants

Our services

■ ■ ■ Survey of the work of both departments

DEPARTMENT RADIATION PROTECTION

Doctor's surgeries, radiology, hospitals

- Experts' evaluation of X-ray and irradiation systems
- Review of quality assurance in therapy
- Leak tests of radioactive sources
- Verification of the design of construction radiation protection

Companies

- Experts' evaluation of X-ray systems
- Leak tests of radioactive sources
- Verification of the design of construction radiation protection

Nuclear power plants, nuclear plants, experimental reactors

- Emission and immission survey
- Tests and expert reports in the approval procedure
- Radioactivity measurements
- Gamma spectrometry
- Alpha spectrometry

Private houses

- Radon dosimetry
- Active and passive radon dosimetry

Waterworks, mines, show caves

- Radon dosimetry
- Active and passive radon dosimetry

Media (print, radio and TV)

- radiochemical tests of foodstuffs (fungi)

DEPARTMENT PERSONAL DOSIMETRY

Doctor's surgeries, radiology, hospitals

- Personal dosimetry with film dosimeters, solid-state dosimeters, nuclear track dosimeters for photon, neutron and beta radiation as well as radon exposure

Nuclear power plants, experimental reactors

- Personal dosimetry with film dosimeters, solid-state dosimeters, nuclear track dosimeters for photon, neutron and beta radiation as well as radon exposure
- Area dosimetry with integrating solid-state dosimeters

Companies

- Dosimeters for travelling to areas with possible exposure to radiation (Fukushima): rental of electronic dosimeters

■ ■ ■ | History

Radiation protection and personal dosimetry at the MPA NRW

- **1947** On 20 May the MPA NRW a state Materials Testing office is founded. Radiation protection belongs to its tasks, especially in the sphere of non-destructive material testing. In this case X-ray apparatuses are used.
- **1952** The MPA NRW is instructed to carry out acceptance tests for non-medical X-ray apparatuses.
- **1960** The "Official Body for Personal Doses" begins to work. About 200 companies (for instance doctor's surgeries) with 2,000 persons are monitored.
- **1962** A own department for radiation protection is established
- **1966** Implementation of the universal dosimeters
- **1972** A new developing machine develops 20,000 films per month
- **1973** With the issuing of the German X-ray ordinance the number of persons to be monitored increases to over 50,000.
- **1974** Development of a film dose measuring station that automatically copies the results onto punch tape, and of a computer programme for the dose calculation.
- **1983** New programmes enable the complete run of the dosimeter daily batches in only six days.
- **1984** Computer programmes allocate the film dosimeters to the corresponding employees of a company
- **1985** A packing machine supports the dosimeter dispatch by post.
- **1998** Implementation by the gliding shadow film dosimeter "Gliding shadow Film GD01"
- **2002** The glass dosimetry system for environmental dosimetry is used.
- **2007** Admission of the albedo dosimeter "MPA-Albedo_GD01", that in ...
- **2009** is extended by the beta ring dosimeter "MPA-BT-KD-01" and the photon ring dosimeter "MPA-TKD-01"
- **2013** A automatic irradiation facility for X-radiation goes into operation.
- **2014** Dosimetry moves into new rooms.



Stefan Lipkowski (left) and Frank Opitz during a building site visit

■ ■ ■ | Our services

Approval tests and surveillances of the essential components of wind power plants according to the

- European technical approval (ETA) i. a. for post-tensioning-systems in the conformity assessment procedure 1+
- national technical approval (abZ) pre-stressing steel products in the conformity assessment procedure (ÜZ)

Accreditation

- notified body (DIBt)
- accredited in the field of public law as a Testing, Inspection and Certification Body
- accredited product certification body (DAKKS) according to DIN EN 45011 for certification programmes for the assessment and verification of constancy of performance within the scope of the Construction Products Regulation

A bridge to the renewables

■ ■ ■ The MPA NRW tests and monitors components for wind power plants

"From the decommissioning of nuclear power plants up to wind power – several departments of the MPA NRW are involved in the energy turnaround." Frank Opitz says this and smiles with visible pride in the direction of his colleague Stefan Lipkowski. The two graduate engineers (Dipl. Ing.) monitor and test components for renewable energy systems. Their main tasks at the MPA NRW are post-tensioning-systems as well as reinforcing

steel products. These terms do not directly make one think of wind power plants. So far the department has attracted more attention with spectacular bridges and other modern construction projects. They actively co-created and accompanied the test procedures for the Ziegelgraben bridge that connects the island of Rügen with the mainland. Further national and international major building works followed, for instance the new "Rhine bridge in Wesel" or the Barbantiño viaduct in Spain. However, the mechanical procedures in the sphere of wind power are not so very different.

Higher and more efficient

"We contribute to the observance of the widely-ranging safety-relevant demands to the essential components for hybrid wind turbine towers of the new generation", explains Stefan Lipkowski. These are towers that can reach a height of up to

150 metres and have rotors with wingspans of up to 54 metres that deliver a nominal energy capacity of more than 3 megawatt. The lower part of the tower consists of precast concrete components and receives its stability due to the post-tensioning-systems that are surveilled and certified by the MPA NRW. These dimensions can only be reached with the prestressing technology. "During a recent building site visit it was also very surprising for us to see which impressive dimensions these wind power plants have", says Frank Opitz. A single tendon consists of 64 to 84 individual wires. Up to 20 tendons stabilise each tower. Every tendon has to bear a prestressing force of 350 tons. From the point of view of test engineering one must take into consideration that the materials are exposed to strong external influences. Therefore we are dealing with a highly complex system.

(to be continued on page 8)



Frank Opitz at a wire manufacturer having the approval seal of the MPA NRW



(continued from page 7)

On board right from the beginning

During the past five years the post-tensioning-systems for the construction of wind energy power plants have been enhanced. The MPA NRW participated in this from the very start. "Many manufacturing companies are our existing customers. Being acquainted with our knowhow, they contacted us during the development stages." Stefan Lipkowski explains the context: "Our task is the surveillance of repressing wires/strands and components for the production of ready-to-install tendons in the manufacturing companies and on the building sites. This also involves numerous test procedures and methods like for instance dynamic fatigue tests and statistical evaluations of the test results according to national and international requirements. Here the evaluation procedure according to Woehler is to be mentioned that has been enhanced by the MPA NRW in cooperation with other accredited bodies."

From top to bottom

How many wires must be used and of which quality structure they should be is a developmental process that is still continuing. "Higher and higher

and more and more efficient is of course important for the manufacturers", underlines Frank Opitz, "but increasing efficiency levels can not go at the expense of safety." For this the MPA NRW stands with its tests also in other spheres of wind energy plants. Even the corrosion protection systems are tested and surveilled in the manufacturing companies and in the laboratories of the MPA NRW.

"The MPA NRW has actively contributed to the fact that such products and components were developed. We quasi monitor the entire manufacturing process. The MPA NRW as a accredited body with a wide range of expertise will continue to help shape the development of the renewable energies."



A wind power plant develops, later stabilised with altogether 20 tendons.



■ ■ ■ | Top down

The MPA NRW monitors

- the manufacturing of complete tendons in the company and on the building sites;
- manufacturers of pre-stressing steel who produce the wires and the strands for the tendons;
- the corrosion protection system from the PE-coat to the used grease, wax or gel and their manufacturers;
- metal building products like the anchor body for fastening the tendons to the ground.

Here five to eight components come together. Such a vast expert network for metal building products, plastics and even chemical components is only available at the MPA NRW!