

NDT- Education in the Industry Sector Railway Maintenance

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1. History of the education Center Wittenberge [1]

Our today education Center in Wittenberge is the result of a development, which began 83 years ago.

The foundation father of this institution was **Prof. Dr. Paul Bardtke** he was the head of the Railway System Maintenance and Repair Workshop of Wittenberge of that time.

In a part of this Workshop installed Mr. Prof. Bardtke that institution which was known under the name „Welding-Technique Attempt Department Wittenberge” (SVA)

The engineers of the SVA-Wittenberge used as first the X-rays to check welded seams. That was an important contribution to develop the NDT-Methods.

She has contributed with her investigations and the public relations to the breakthrough of the industrial Radiographie.

In particular, as the pioneers of the first hour, especially the engineers **Mr. Carl Kantner** and **Mr. Adolf Herr** as well as the X-ray engineers **Mr. Walter Grimm** and **Mr. Friedrich Wulff**, you managed the proof that with the help



Picture 1: Prof. Dr. Paul Bardtke [2]

Of the X-ray check an assessment of the quality of welded joints is possible.

A successful application of the X-ray testing needs well X-ray-technically qualified employees, this knowledge was soon accept. Recognized also the persons responsible of the SVA Wittenberge and carried out in 1935 the first course for quality inspector and X-ray engineers DR. This year came into the history as the beginning of the education according **Mr. Prof. Dr. Paul Bardtke** to course and advanced training of materials testers with DR. On account of structural changes in the research being and developing being DR. the SVA Wittenberge was dissolved to the 31.12.1959.

For the employees which remained in Wittenberge began the change of an attempt institution in an educational institution.

The changes which arose by the opening of the border between the east and west in November 1989 were similarly serious. With the reunion of Germany and the technical and organizational desegregation of the Bundes Bahn (DB) and the Deutsche Reichsbahn the training system of both railway systems was also harmonized.

In connection with the union of both railway systems to the Deutschen Bahn AG it was decided in June, 1994 by the railway systems board of directors to carry out the education of the NDT staff only in Wittenberge.

Our special thanks count for **Mr. K. Egelkraut** here. He and his employees performed till 1994 a lot in the area of the non destructive test methods for the DB. In the alliance at that time the central office Minden the test methods were developed partly even today are valid, how the ultrasonic testing of wheel set waves with axial borehole or the rail check with the rail testing set. Up to closing this institution approx. 10.000 tester and test supervisors were trained there in the time from 1953 to 1994.

The study group around **Mr. Egelkraut** allowed by her generous support that now more in the location Wittenberge the education could be continued almost freely from problems. With the reorganization of DB AG initiated, leads to changing also in the training system, on 31.12.1998 after 75 years of successful activity in the area of the education and advanced training to closing this educational institution.

While the weld-technical education was ended completely, the education of the Non Destructive testers remained in Wittenberge for the railway system. The German Society for Non Destructive Testing (DGZfP) which took over the suitable employees of the DB AG and the education building and continued with it this education tradition.

In summer, 2003 the old education building in which 80-year NDT history were written was given up by the DGZfP. Cause for this was the reconstruction of the railway station Wittenberge and the demolition linked with it of the footbridge which originally allowed the direct access of the course participants from the railway station to the training center.

2. Tasks of the education Center Wittenberge

(Overview about the testers- and test supervisions qualifications)

The application of the procedures of the ndt with the maintenance of vehicles and rail way arrangements requires a special education and advanced training of the staff responsible for it.

The education and advanced training in the area of the ZfP in the industrial sector rail way system maintenance (IS 9) is carried out on the basis of technical sets of rules, norms and in-plant regulations. The following sets of regulations are the base for it:

- Leaflet UIC 960 „ Qualifications and certification of staff of the non destructive check for Rail way vehicle
- DIN EN 473 „ Qualification and Certification of personal of the non destructive testing

With the recognition of the qualification system of the DB AG in 1996 by the ' independent certification department“ of the German society for non destructive check, is it possible that tester of the level 1 and 2 in the IS 9 for the testing methods MT, UT and VT to certificate. Because in the testing method ET the qualification occurs only in the level 1, the granting of the competence certificate can happen also here only for the level 1.

The approved exam center of the Industry Sector 9 is furnished by DB AG TZF 92 in Brandenburg-Kirchmöser. The exam Center has the task to preparations and to carry out the qualification examination and the certification from testers in according the industrial sector and the EN 473.

On grounds of the different stress-conditioned damages, geometry, test terms and therefore also different special test equipment, get further divided the IS 9 applications in the railway sidings and workshops.

The terms "railway sidings" stands here for the applications of the testing methods within the scope of the inspection of rails and rail points.

With "**workshops**" the application of the testing methods is summarized in rail vehicles in particular of the components of the bogies within the scope of the maintenance.

3. Qualifications

The test personal is qualified as Tester or NDT-Supervisor.

The testers qualifications occur accordingly of the need for the testing methods:

- Eddy Current Testing ET,
- Magnetic particle Testing MT,
- Ultrasonic testing UT,
- Visual Testing VT.

The NDT Supervisors are qualified in 4-week basic courses for the level 3. Also here be different contents between railway sidings and workshops

The biggest differences are between the subjects to the objects study and also with the access conditions, a qualification UT 1 railway sidings is necessary for the supervisor in the area of railway sidings.

While a test supervisor needs one more level 2 qualifications for the ultrasonic testing, alternatively for the magnet particle testing for the workshops for her appointment in this function.

A specific feature marks this industrial sector. The whole NDT personal which with the DB AG or as a service provider for the DB AG is active, have to prove before the expiry of 5 years his knowledge and skills in a refreshing course which end of a refreshing examination.

Tester of the level 1

Tester of the level 1 are enabled which is usually in EN 473, plus special skills for UT 1 to carry through the ut-test for axle with axial hole.

Tester of the level 2

Tester of the level 2 are enabled which is normal in EN 473

- To provide test instructions for components not relevant for security

4. Presentation of some Applications of ndt-methods during the education

a) Railway Sidings

Ultrasonic testing UT

- Mechanized checking in the rails test train
- Partial-mechanized check within the scope of the regular inspection of the railway tracks with the rail testing set (SPG) and by the checks by announcements of the rails test train arrange become.
- Manual check to the quality assurance with rail welds
- Manual check with the level-according soft inspections

Eddy current testing ET

- Mechanized checking in rails test trains
- Check of the feather place in points (area of the movable parts of points) (
- Partial-mechanized checking of the rails for the damage depths causes by " Head of checks "

Visual Testing VT

Manual testing to the statement of the superficial damages:

- Head checks,
- Belgrospi's and
- Squat's

b) Workshops

Ultrasonic Testing UT

- Manual testing of wheel set axle with axial drilling and with out drilling
- Manual testing of wheels (foil)
- Manual check of components the train and
- Manual testing of wheel set axle with axial drilling and with out drilling
- Manual testing of wheels
- Manual check of components the train and

Magnetic particle testing MT

- Examine of the bicycle discs, rims, wheel rim
- Examine from welds in bogies

Eddy current testing ET

- checking of bicycle discs and treads of the railroad wheels (also mechanizes in test arrangements

Visual testing

- of the treads of railroad wheels
- in bogies, e.g., test of the welds and areas from the axle bearing
- check welding joints by any high power bumper

Qualifications system by the sector railway system-maintenance							
NDT- Methods	Levels of Qualification EN 473						renewal course ¹⁾
	level 1			level 2			
	course	work experience	examination	course	work experience	examination	
ET Eddy Current Testing	ET 1.O 7d		Q ET 1.O 1d				ET 1.E-O (from 2009)
	ET 1.W 7d		Q ET 1.W 1d				ET 1.E-W 4d
MT Magnetic Particle Testing	MT 1 4d		Q MT 1 1d	MT 2 3d		Q MT 2 1d	MT 1.E 3d
							MT 2.E 3d
PT Penetrant Testing	PT 1 2d		Q PT 1 1d				PT 1.E 2d
RT Radiographic Testing	RT 1 10d		Q RT 1 1d				RT.E 5d
UT Ultrasonic Testing	UT 1 10d	UT 1.O 5d	Q UT 1.O 1d	UT 2 10d (Modul 1 und 2)	UT 2.P 5d (Modul 3)	Q UT 2 2d	UT 1.E-O 5d
		UT 1.W 5d	Q UT 1.W 1d				UT 1.E-W 5d
							UT 2.E 5d
VT Visual Testing	VT 1.W 3d		Q VT 1.W 1d	VT 2 3d		Q VT 2 1d	VT 1.E-W 2d
							VT 2.E-W 3d (from 2007)
	VT 1.O 3d		Q VT 1.O 1d				VT 1.E-O (from 2010)
qualification of ndt supervisor							
Railway Sidings	UT 1 10d	UT 1.P-O 5d	Q UT 1 1d	Basic Cuorse 19 d		Q P-O 1d	P.E-O ²⁾ 5d
Work Shops	Basic Cuorse 19d		Q ZG Bahn 1d	MT 2 3d		Q MT 2 1d	P.E-W ²⁾ 5d
				UT 2 10d	UT 2.P 5d	Q UT 2 2d	
¹⁾ is necessary ≤ 5 years or if the case the tester interrupt his work as tester more then 1 year							
²⁾ The renewal course for ndt supervisor contains at the time the renewal the authorization of tester for ndt-methods MT or UT							

Table 1: Qualifications system by the sector railway system-maintenance

References

- [1] Text K. Lange the last head from the Welding and Testing technique Education Center Wittenberge
[2] SVA Wittenberge Archivbilder Sammlung K.Lange