NDT TRAINING IN THE INDUSTRIAL SECTOR
RAILWAY MAINTENANCE IN GERMANY

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Abstract
The German Society for NDT opened in the year 1999 a training centre focused on the railway maintenance sector. It took over the long tradition of German Rail (DB) in training of NDT operators.

The sector specific training is offered in the methods UT, MT, ET and VT in two levels. A specialty is the NDT-supervisor: a person with level 2 (Railway) in two methods plus a 4 week basic course. All training is divided in two subgroups: railway car maintenance and superstructure (tracks).

The UT training is the largest part of the business. A basic education is followed by special modules dealing with subjects like wheel set testing, operating mechanized testing equipment, track testing, switch testing. VT has also a huge importance in this sector, followed by MT and ET. A huge number of real specimen is available to support in every method a training close to industrial practice.

During the years the training center was growing steadily and today we are offering a capacity of 100 participants per day. Because of the requirements of the German Standard DIN 27201 and the strong control of its implementation by German Railway Authority in 2011 the request for training will rise.

Keywords: Training Sector Railway Maintenance

1. Introduction
In the year 1923 the German Railways founded its own welding engineering institute. It was located in the town Wittenberge not far from Berlin. There was an important maintenance workshop for the overhaul of locomotives and cars. In 1935 they started the first courses in RT and General NDT. During the iron curtain the East German “German Rail” and the West German “German Federal Railways” developed their own way of NDT training each. In 1990 both railways reunited and focused their training in Wittenberge again.
In 1998 it was decided to outsource the NDT-training and the German society for NDT was selected. The well developed course concepts form general industries where incorporated and railway specific components added. During the following 10 years the railway-NDT-training moved closer and closer to EN 473 with specialities remaining.

2. Training

2.1 Methods
Companies active in the railway sector are using almost all known NDT-methods from acoustic emission to ultrasonic testing. A railway specific training is required only in the field of maintenance and limited to some methods with a very specific or complicated application:

- Ultrasonic testing
- Magnetic particle testing
- Visual testing
- Eddy current testing

2.2 Sub Divisions
The first division is named “Car maintenance”.
The major testing objects are wheel sets with axes, wheel body, steel tyres but also other parts of cars like suspension system and buffer. After a general training the participants learn a lot about the basics of the objects, their failure mechanisms and the typical application of the tests. A large practical training is added to develop skills.

The other division is called “Superstructure”
In this division the railway tracks are in the focus of the training, their control and maintenance. One can imagine how complicated a manual UT in the field could be. So there is a lot of special equipment for this task to show and to handle.

2.3 Training System
The training in field of Magnetic Particle Testing, Penetrant testing, Eddy Current Testing and Radiographic Testing is very similar to the general industries courses. The major differences are the use of railway specific specimen and the orientation on railway testing rules.
The training for Ultrasonic Testing differs significantly. A basic training of ten days is followed by several practical courses with duration times between 5 and 10 days. Focused on special railway specimen the failure mechanisms, analyses and testing procedures are shown. In one of the practical courses the participants have to practice intensively the manual test of a hollow shaft with special probes, a lot of geometric echoes, tons of grease. During the final examination real failures have to be detected, for many operators the only real failure they see in their career.

![Diagram of UT-Training Level 1](image)

The training in level 2 UT is dealing with the evaluation of echo heights, testing procedures and railway specific rules. A huge part handles the testing of welds.

![Diagram of UT-Training Level 2](image)

An enormous number of participants is joining the Visual Testing courses. The majority of these people take a combined course level 1 and level 2 and enter the level-2-examination.

### 3. Supervisors

The obligatory NDT-document for every railway company on the German market is DIN EN 27201-7, required by the German Railway Authority. The
qualification of operators is ruled as well as many other conditions for the application of NDT in a workshop.

This standard requires every workshop to name a qualified supervisor to organize and control the NDT. The qualification of this supervisor is between level 2 and level 3. He is required to hold two level -2-qualifications in the railway sector and has to complete successfully the basic-course for supervisors, a 20 day training.

4. Renewal

A qualification in railway sector in Germany is only valid for 5 years. At the end of this period a renewal course and examination has to be passed. The duration is between 3 and 5 days. From the viewpoint of an training organisation this regulation is much more sufficient than the rules of EN 473. We get the possibility to recover seldom used knowledge and skills, to inform about new developments and to prepare the people for the examination. This is for both sides very satisfying.

5. Qualification Transfer

In some cases NDT-operators with a multisector qualification have to gain also the railway sector. These people are very often employees of service inspection companies.

A simple passing of the specific and practical examination is not sufficient. The standard requires joining a practical course before examination.

For a level 3 it is the requirement to pass the railway-specific level 1 course, to learn the practical application of NDT in this sector.

6. Summary

The qualification of NDT-personnel in the railway sector in Germany differs significant from EN 473. Main differences are the extensive practical courses and the renewal conditions. A special qualification level is the supervisor. The transfer of qualifications from multisector is not simple

7. References