

THE TEACHING MODEL AND PRACTICE OF “DOUBLE CERTIFICATES” -THE ADVANCING ABOUT TEACHING REVOLUTION OF NONDESTRUCTIVE TESTING ENGINEERING FOR AIRCRAFT STRUCTURE

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Abstract: Nondestructive testing is the professional that must have the technique degree certificate. Before 1995, the graduates of our institute are spent into the different degree factories of aeronautical repairing factory or other army where they must study for a year again, then they are untidily trained by air-force, when they have gained the technique degree certificate, they can be allowed begin to work, so it needs a lot of men and wealth. Nondestructive testing engineering of aircraft is sure of the teaching model of “double certificates”, it not only requires finishing the aims and content that are planned by institute teaching and required by the united model, but also it adds the aim about defining degree content of aeronautical repairing. It begins to notice the relation of the teaching aim and nation requirement, and it also suit of the professional, the students who are studying must strengthen the practice ability in the labs. The factory of aeronautical repairing, army and local factory, it must learn the knowledge that for graduates that they have gained the technique degree certificate can work. Immediately, it is successful to train peoples for air force in the professional technology.

Keywords: aircraft, nondestructive, testing training, double certificates

1. “Double certificates” teaching model

In Sep. 1983, Feb.1985, and May 1986, a number of NDT (Nondestructive Testing) major committer Tc135 had discussed and announced the “the Draft of the principle of qualifications for Nondestructive Testing People”, in SC 7,ISO. After many times on probation, adding and righting the mistakes, the ISO9712 was issued in 1992. On the base of it, “the National Standard of qualifications for Nondestructive Testing People” was declared in China, GB9445-88. Following, some local departments, such as chemistry industry, aviation, and space flight started the method of working with certificate. At present, in the field of aviation repairing of air force in china, only those who are ended in the work of nondestructive testing are requested to gain the certificates. Our institute started to cultivate the two years student for the work nondestructive testing in 1991, and began to cultivate the three years student in 1996. The old method of teaching is that the graduated students who ! were cultivated in accordance with the teaching program must go to the different form of aviation repairing factories or the army for a year, and then the air force trains them again. They can’t work until they acquire the certificate. The old way of teaching needs many people and cost a lot of money. In May 1994, the leaders of our institute relied on the national standard and the requirement of the air force, and took a reform on the teaching method of nondestructive testing in time, they put out that the students who graduated from the subject of nondestructive testing should go to work with the double certificates directly and needn’t training again. These made them successfully finish the first work. Through investigation, we determined the following model, that is finishing the plan of the academy, and at the same time, take the emphasis on the combination of

the lessons and the standard of nation, add some lessons of the aviation repairing rank examination, namely!

every sort of testing adds three items examinations on the base theory, departments of industry and the operation. During the course of study, students will take the advantage of operation at academy, aviation repairing factories, army and local factories, which complete the requirement which need for a year in the army. The gradutors will go to work with double certificates.

2. The way to put the “double certificates” into effect

If you want to use a new teaching model, it is impossible to copy old ones. Because the air force is different the local, we can't use the national standard completely. Moreover, the request of the air force for the person who work with nondestructive testing is not the same every year, we can't implement the plan of teaching without making changes either, instead we should take the two aspects in two consideration. The concrete measures include:

(1) Correcting the request of teaching

The main professional object of NDT, aircraft structure and strength (50), the testing and repairing of aircraft accessory (50), the technology of NDT (112), the facility of NDT (106), the airplane destructive situs testing (64), comprehensive practice (80) the design for graduation, and so on. There are 542 classes in all; it contains 282 classes for NDT. Training of country defining degree requested is according to the classification of testing. (Showing one). According to the demand of the army every year, we choose two sorts of testing meaning to have defining degree examination. For example, in 2000, we choose UT and MT. The classes were added for a suitable number (100 and 50 separately), at the same time, the others (RT, PT, ET) were classified again (60,20,40), such as showing two. It is not only satisfied the whole teaching demand, but also was suitable for the demand of defining degree training. Showing one the classes of training of defining degree

Method	Degree one	Degree two
RT	60	120
UT	60	120
MT	36	60
PT	24	60
ET	60	120

Showing two actually training classes of training of defining degree

Method	Degree one	Degree two
RT	60	100
UT	40	100
MT	36	50
PT	20	40
ET	40	90

(2) Compiling textbooks

Which contain very much knowledge and tend to be used for manufacturing industries for the major NDT textbooks in local college,. It doesn't fit the air force which faces to working aircrafts, it's very necessary for us to compile special textbooks, so we combined the aircraft NDT characteristics with the rank training request, and compiled the following textbooks “Testing of Airplane Destructive ”, “Nondestructive Testing

Technique”, “Nondestructive Testing Equipment and Technology”, “Airplane Destructive Situs Testing” and so on. At the same time, we also compiled a set of handbooks for practice and experiment.

(3) Strengthen the teacher’s ability

The teacher’s ability is a very important factor. We choose good undergraduates and postgraduates as teachers, and choose the person who is good at his course to study outside, we encourage them to improve their abilities to become “double teaching” type. At the same time, we invited honorary professors and double teachers from aviation repairing factories. Now among the teachers, they have professors, engineers, teachers and assistants.

(4) Renewing the facilities of practice

The good facilities are very necessary for classing exam, and it needs more high abilities to operate them. For this reason the air force and academy allocate lots of money to add some new facilities for the teaching, practice and examination. Such as, ultrasonic testing instrument, hole testing instrument combination material testing instrument, and so on.

(5) Using new technology in teaching

In class, we use some new theory about inspection or testing, new methods and new facilities. For example, we introduced NDT about su-27, new testing equipment KK-30 and smart 97 eddy current instrument about its characters, structure, using and repairing for the request of the army and the future. On the base of the tradition method of teaching, we take the advantage of the technology of mull-media and other new methods of teaching to improve the qualities of teaching. (6)Emphasizing on practice To assure the basic abilities of the students on work, we take them with questions to visit the local factories, aviation repairing factories and the aviation army. It is very necessary to practice. For example, in June 1996, the students practiced in one aviation-repairing factory of air force to adapt the work environment after graduating, it reduces badly time for practice. This is a very important base for the “double certificates”.

3. The results of “double certificates”

Most of the testing students take double certificates by classing exam, namely “Graduation Certificate” and “Professional Technique Degree Certificate”, it is good begin to their work. Our institute has combined the professional teaching with training of taking certificate since 1994. Passing the strictly exam, the rates of that gained the two degree certificate of MT, ET are respectively percent of 85 and 82 in 1995. In 1996, the rates are percent of 84 and 86. The following years, it is always higher than percent of 85. The professional graduator’s abilities to work actually are improved through the classing examination. It’s obvious for the benefit of economy and military. In recent years, it is less one million Yuan than before about material exhaustion except for affecting work organized in air force. And it has trained 100 nondestructive testing engineers for our army, and 7 nondestructive people of NDT for foreign army. The graduators over percent 70 gained pra! ise and made many merit. In 1999, certain new graduator tested out a 5mm length cracks of certain kind of air craft in certain division, avoided an deadly accident and reduced the less of millions Yuan. In all air force, the reduced loss is not less of tens than millions of Yuan because for NDT, and assured safety of flight and normal training. Now these people have become the nondestructive testing technician in aviation army. In 1997, the subject was defined the Ninth- five important training subject in our college. Two of teachers gained advanced position. Four of them gained the II degree certificate

of RT, UT, ET, MT and PT, three of them gained the III degree of ET, UT, MT. And they published more thirty spaces of periodical and technique papers; And they compiled eight of teaching books in training or out training, published“ Aircraft Destructive Situs Testing”, they researched that “Computer Controlling Instrument of NDT” and “Testing Instrument of Aircraft Cable! ”, compiled the rule file “Testing Technique of Certain Aircraft”, “Reference of NDT” and “Training Soft of NDT Classing” and so on. “Double Certificates” teaching model gained two-grade medal of institute teaching in 1998. AT the same time, the labs were defined the two-grade training labs by air force NDT qualification, NDT training center of air force have been set up initially.