The current situation and development of Chinese higher education

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Abstract:
The first major of Non-Destructive Testing was established in NanChang HangKong University in 1982, more than 20 universities and research institutions have recruited NDT colleges, Bachelors, Masters and doctors in these 30 years. Some enterprises have found the postdoctoral research station as well. The high education graduates are distributed in China’s aerospace, energy, building and other industries. And they are playing great roles in the Non-destructive Testing field now. Chinese Society for Nondestructive Testing (ChSNDT) has done a lot of work in order to make better development for higher education, we have cooperated with some universities and colleges to provide support.
This paper describes the growth trajectory of Non-Destructive Testing in high education filed in China, and expectation for the development of the future.

Keywords: Education, Training, Future Development of Chinese NDT

1. Foreword
In 1979, supported by the industry office of national defense and national education committee, according to the spirit of National Defense Industry Office resolution meeting in Nanning, Nanchang Institute of Aeronautical university formally prepared four-year undergraduate of non-destructive testing major, and enrolled in 1982, at the same time, a new era of higher education in China non-destructive testing has begun. Until 2012 the NDT major has been founded 30 years, the graduates of this major were from all over the country in various industries, many graduates have been leaders and technical staff in the field of nondestructive testing.

2. Overview of higher education of non-destructive testing
2.1. Bachelor Education
Chinese education system is different from the west. The former Soviet Union and the United States non-destructive testing haven’t "professional", only offer a number of non-destructive testing courses in the faculty. China is different, for example
Nanchang Aviation university established a “NDT teaching and research section” in the Department of Mechanical Engineering, and the establishment of undergraduate non-destructive testing, and opened a NDT course.

Bachelor education courses have: Basic including radiation, acoustic, electromagnetic. Professional courses including radiation testing technology, ultrasonic test, magnetic test, eddy current test, penetrate test and new technology of NDT. At the same time opened lab course, NDT skill training, graduation project etc. The students learn 4 years in the university.

After 1982, Nanchang Aeronautical University (formerly Nanchang Institute of Aeronautical Engineering), Northern Jiaotong University, Wuhan Institute of Technology, Fushun Petroleum Institute, Suzhou University, Wuhan hydropower Institute, East China University of Technology, Dalian University of Technology and other institutions recruit undergraduates of non-destructive testing. More than 4500 non-destructive testing senior personnel have been trained in recently 30 years.

2.2. College Education
Currently there are three types of Chinese college education: two-year college, three-year college and vocational high education institution. They have same course offered. colleges such as Liaoning JiDian polytechnic, Shenzhen Polytechnic, Changsha Labor and personnel Management College etc. have trained more than 2000 students in recently 20 years. These students are mainly working in the engineering inspection company and engaged in the first-line non-destructive testing inspection work. As the college students both have solid theoretical knowledge and strong practical ability in school and have obtained the corresponding certificates through training and certification. When they join the unit, they can engage in testing work immediately, very popular with the society welcome.

2.3. Master Education
In some universities of higher learning and scientific research institutions there have NDT of master education, including master's, doctoral and postdoctoral. These universities and institutions are: Tsinghua University, North University, Chongqing University, Beijing Aerospace University, Tongji University, East China University of Technology, Huazhong University of Technology, Dalian University of Technology and the Institute of Acoustics, Chinese Academy of Sciences, Wuhan Institute of Mathematics and Physics and other unit. In the past 20 years, more than 500 NDT personnel have been trained. These institutions also gained a number of research results, achieved a variety of awards, especially Industrial photography chromatography technology (ICT) of Chongqing University obtained a National Science and Technology Progress second award.

3. ChSNDT support the education of higher education
ChSNDT’s supporting higher education for non-destructive testing mainly in technical support, academic exchanges and training and so on. On November 4 1990, ChSNDT also set up training and science education working committee responsible for education and science work to research the situation of domestic non-destructive
testing of higher education, help students enrollment and employment. ChSNDT also organized a strong nondestructive testing technology delegate of higher education to visit other countries to learn and introduce foreign advanced technology concepts into domestic education work, which make undergraduate's base theory of NDT international and improve their future NDT work.
ChSNDT website: [www.chsndt.com](http://www.chsndt.com)

4. Construction of teaching materials

Since 1982 NDT major founded, all institutions of higher learning have edited various kinds of versions of nondestructive testing teaching materials, for example, Nanchang University of Aeronautics edited the "radiation testing technology," "electromagnetic testing" "ultrasonic testing" and other university bachelor teaching materials, and led by the Shenzhen Polytechnic written set of NDT teaching materials has been used in domestic colleges and universities.

![Teaching materials of higher education](image.jpg)

5. Construction of laboratory

Colleges and universities generally have built the five regular technology laboratories, and students can make regular NDT practice and training.

Approved by the Ministry of Education, Ministry Education Key Laboratory of non-destructive testing technology of Nanchang Aeronautics University was established in 2005. The key laboratory has nearly 4000M2 areas, equipments valued about $12.2 million RMB. Ten laboratories were set up: Ultrasonic imaging lab, electromagnetic testing lab, industry CT lab, radiation testing lab, imaging processing lab, automatic and control lab, laser testing lab, high temperature moiré testing lab, corruption protection and microscope analysis lab. It has established a good platform for research and personnel training.
Ministry Education Key Laboratory of non-destructive testing technology of Nanchang Aeronautics University

Approved by the Ministry of Education, Chongqing university set up industrial CT engineering research center of ministry of education, and training master and doctor of non-destructive testing major, accomplish scientific research project and achievement industrialization at the same time. ICT equipments in the center played an important role in China space program, missile and nuclear industry and other areas of product quality testing in our country, also made great contribution to military industrial development and the national economy.

6. Currently problems and expectation

Higher education development process of China NDT has been 30 years and made a gratifying achievement, but there is still distance from the national requirements, also has very big development space. It is reflected in the following factors:

1. The quality of teaching is not stable enough, the quantity and quality uneven. In recent years, with the development of national education, the number of non-destructive testing enrollment are increasing a lot, but teachers do not fully keep up with the experimental conditions, resulting in many basic experiments can not be opened, basic quality of a large number of graduate students decreased.

2. The construction of teaching materials do not keep pace with the times. Teaching materials should keep update with technology developing, however many universities still use decade years ago materials, even use training materials instead of university materials.

3. Higher education doesn’t sufficiently link with enterprise development. Higher education train senior technical personnel for the development of national economy, therefore, cooperation between universities and enterprises should be more closely,
but not enough. Many foreign universities’ operating costs, research costs are from large enterprises, so the universities have a sense of mission and responsibility of enterprises. Our funding comes from state funding or student enrollment, and more student recruiting means it is difficult to ensure the quality if teaching, it’s a vicious cycle.

Inclusion, if our teachers, teaching materials, experimental conditions and the cooperation with large enterprises could be improved, I believe the development of Chinese higher education, non-destructive testing will achieve greater successes.

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