

# Non-Destructive Testing

\*This exam is in pilot status for the 20-21 school year. No certificate is available.

EXAM INFORMATION	DESCRIPTION																						
<b>Exam Number</b> <b>598</b>	An introduction to the five major non-destructive testing methods, certification requirements, inspector's responsibilities, visual testing, and the use and operation of gauges.																						
<b>Items</b> <b>41</b>																							
<b>Points</b> <b>44</b>	<b>EXAM BLUEPRINT</b>																						
<b>Prerequisites</b> <b>NONE</b>	<table border="0"> <thead> <tr> <th>STANDARD</th> <th>PERCENTAGE OF EXAM</th> </tr> </thead> <tbody> <tr> <td>1. History of Non-Destructive Testing</td> <td>5%</td> </tr> <tr> <td>2. Introduction to Non-Destructive Testing Methods</td> <td>5%</td> </tr> <tr> <td>3. Uncommon Non-Destructive Testing Methods</td> <td>5%</td> </tr> <tr> <td>4. Function of Non-Destructive Testing</td> <td>11%</td> </tr> <tr> <td>5. Applications of Non-Destructive Testing</td> <td>44%</td> </tr> <tr> <td>6. Quality Control/Quality Assurance</td> <td>7%</td> </tr> <tr> <td>7. Economic Factors</td> <td>5%</td> </tr> <tr> <td>8. Qualification of Personnel</td> <td>11%</td> </tr> <tr> <td>9. American Society for Non-Destructive Testing</td> <td>5%</td> </tr> <tr> <td>10. Future Growth and Expansion</td> <td>2%</td> </tr> </tbody> </table>	STANDARD	PERCENTAGE OF EXAM	1. History of Non-Destructive Testing	5%	2. Introduction to Non-Destructive Testing Methods	5%	3. Uncommon Non-Destructive Testing Methods	5%	4. Function of Non-Destructive Testing	11%	5. Applications of Non-Destructive Testing	44%	6. Quality Control/Quality Assurance	7%	7. Economic Factors	5%	8. Qualification of Personnel	11%	9. American Society for Non-Destructive Testing	5%	10. Future Growth and Expansion	2%
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<b>Recommended Course Length</b> <b>ONE SEMESTER</b>																							
<b>National Career Cluster</b> <b>MANUFACTURING</b>																							
<b>SCIENCE, TECHNOLOGY, ENGINEERING &amp; MATHEMATICS</b>																							
<b>Performance Standards</b> <b>INCLUDED (OPTIONAL)</b>																							
<b>Certificate Available</b> <b>No</b>																							

## STANDARD 1

*Students will understand the history of non-destructive testing (NDT).*

- Objective 1 Describe the origins of the six basic methods of Non-Destructive Testing.
1. Visual inspection
  2. Penetrant inspection
  3. Magnetic particle and eddy current inspections
  4. Ultrasonic inspection
  5. X-rays Radiography
  6. Liquid penetrant

Standard 1 Performance Evaluation included below (Optional)

## STANDARD 2

*Students will understand an introduction to non-destructive testing methods.*

- Objective 1 Perform a simple inspection using the basic five inspection methods.
1. Use of ultrasound in thickness gauging
  2. Use of eddy current in crack detection
  3. Use of radiography in locating weld defects
  4. Use of magnetic particle in weld inspection
  5. Use of penetrant in crack detection

Standard 2 Performance Evaluation included below (Optional)

## STANDARD 3

*Students will be able to understand uncommon non-destructive testing methods.*

- Objective 1 Compare the uses of uncommon methods to the methods in wide use today.
1. Thermal inspection in defect detection
  2. Acoustic inspection
  3. Changes with regard to computers

Standard 3 Performance Evaluation included below (Optional)

## STANDARD 4

*Students will be able to understand the functions of non-destructive testing.*

- Objective 1 List the uses and functions of NDT.
1. Five primary forms of NDT used in a given industry

Standard 4 Performance Evaluation included below (Optional)

## STANDARD 5

*Students will be able to understand applications of non-destructive testing.*

- Objective 1 List and describe applications of NDT methods.
1. Visual inspection
  2. Penetrant inspection
  3. Magnetic particle and eddy current inspections
  4. Ultrasonic inspection
  5. X-rays Radiography
  6. Liquid penetrant

Standard 5 Performance Evaluation included below (Optional)

## STANDARD 6

*Students will be able to understand quality control/quality assurance.*

- Objective 1 Describe the structure of quality control.
1. Chain of command flow
  2. Flow diagram
    1. Flow diagram for liquid penetrant
    2. Pre-cleaning
    3. Penetrant application
    4. Penetrant dwell time
    5. Removal of excess surface penetrant
    6. Development application
    7. Inspection
    8. Post cleaning
  3. NDT inspection
  4. Visual inspection

Standard 6 Performance Evaluation included below (Optional)

## STANDARD 7

*Students will be able to understand economic factors.*

- Objective 1 Judge the economic factors involved in selecting a particular NDT.
1. Lowest cost
  2. Compare costs of the five basic methods

3. Economic advantages to NDT over *not* inspecting a product

Standard 7 Performance Evaluation included below (Optional)

## STANDARD 8

*Students will be able to understand qualification of personnel.*

- Objective 1 List the documents that govern NDT inspectors.
1. Two major documents governing NDT certification
    1. ASNT SNT-TC-1 American Society of Non-Destructive
    2. NAS 410 – National Aerospace Standard
  2. Most widely used qualification/certification document in aviation industry
  3. Three procedures widely used in NDT

Standard 8 Performance Evaluation included below (Optional)

## STANDARD 9

*Students will be able to understand the American Society for Non-Destructive Testing.*

- Objective 1 Describe the advantages of a national society of inspection.
1. Quality control department
  2. Advantage to a national organization
- Objective 2 International involvement of NDT.
1. Identify different NDT societies in different countries

Standard 9 Performance Evaluation included below (Optional)

## STANDARD 10

*Students will be able to understand future growth and expansion.*

- Objective 1 State the projected growth and expansion of NDT.
1. Infrastructure is the fastest growing area

Standard 10 Performance Evaluation included below (Optional)

## NON-DESTRUCTIVE TESTING (OPTIONAL)

Performance assessments may be completed and evaluated at any time during the course. The following performance skills are to be used in connection with the associated standards and exam. To pass the performance standard the student must attain a performance standard average of 8 or higher on the rating scale. Students may be encouraged to repeat the objectives until they average 8 or higher.

Student's Name: \_\_\_\_\_

Class: \_\_\_\_\_

### PERFORMANCE STANDARDS RATING SCALE



#### STANDARD 1 - History of Non-Destructive Testing

Score:

- List the year and industry that originated penetrant inspection.
- List the year and industry that originated magnetic particle, and eddy current inspections.
- List the year and country that originated ultrasonic inspection.
- List the year and person that discovered x-rays.
- List the industry that originated liquid penetrant.

#### STANDARD 2 - Introduction to Non-Destructive Testing Methods

Score:

- Demonstrate the use of ultrasound in thickness gauging.
- Demonstrate the use of eddy current in crack detection.
- Demonstrate the use of radiography in locating weld defects.
- Demonstrate the use of magnetic particle in weld inspection.
- Demonstrate the use of liquid penetrant in crack detection.

#### STANDARD 3 - Uncommon Non-Destructive Testing Methods

Score:

- Explain the use of thermal inspection in defect detection.
- Assess the value of acoustic inspection as related to cost and the use of the more common methods of defect detection.
- Summarize in a short statement the changes taking place in the inspection field with regard to computers.

#### STANDARD 4 - Functions of Non-Destructive Testing

Score:

- Rank in order five primary forms of Nondestructive Testing used in a given industry.

**STANDARD 5 - Applications of Non-Destructive Testing**

**Score:**

- Name one application of ultrasonics in a specific industry.
- Name one application of radiography in a specific industry.
- Name one application of penetrant in a specific industry.
- Name one application of magnetic particle in a specific industry.
- Name one application of eddy current in a specific industry.
- Show how each of the above applications if not used could lead to a failure of materials.

**STANDARD 6 - Quality Control/Quality Assurance**

**Score:**

- Determine the chain of command flow in quality control.
- Construct a flow diagram of a typical quality control system.
- Compare Nondestructive Testing inspection to visual inspection.

**STANDARD 7 - Economic Factors**

**Score:**

- Select an inspection that would be of lowest cost for the company.
- Compare the costs of the five basic methods and rank in order of least to most expensive.
- Understand the economic advantages of Nondestructive Testing over not inspecting a product.

**STANDARD 8 - Qualification of Personnel**

**Score:**

- Compare the differences between the two major documents governing Nondestructive Testing certification.
- Summarize the materials in the two documents in a two-paragraph statement.
- List the most widely used qualification/certification document in the aviation industry.
- Summarize information found in three procedures that are widely used in Nondestructive Testing.

**STANDARD 9 - American Society for Non-Destructive Testing**

**Score:**

- Construct and illustrate a flow chart showing the links in a quality control department.
- List one advantage a technician would have if he/she joined a national organization.

**STANDARD 10 - Future Growth and Expansion**

**Score:**

- Point out and explain why infer structure is the fastest growing Nondestructive Testing area in the country.
- Compare three areas, assess the growth potential, and list them in order of most likely to grow to least likely to grow.

**PERFORMANCE STANDARD AVERAGE SCORE:**

Evaluator Name: \_\_\_\_\_

Evaluator Title: \_\_\_\_\_

Evaluator Signature: \_\_\_\_\_

Date: \_\_\_\_\_