

## Appendix 9

## PTレベル1初回訓練用シラバス 一般 Penetrant Testing Level 1 Initial Training Syllabus General

| Subject<br>訓練内容                                                                  | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目          | Detail<br>訓練内容詳細                             |
|----------------------------------------------------------------------------------|------------------------------------|-----------------|-----------------------------------|----------------------------------------------|
|                                                                                  | Classroom<br>講義                    | Practical<br>実習 |                                   |                                              |
| Introduction<br>序論                                                               | 0.50                               | 0.00            | General knowledge of NDT<br>NDT一般 | Purpose of penetrant inspection<br>浸透探傷試験の目的 |
|                                                                                  |                                    |                 |                                   | Discontinuity and defect<br>不連続部ときず          |
|                                                                                  |                                    |                 |                                   | General shape of defect<br>きずの基本形状           |
|                                                                                  |                                    |                 |                                   | Words and terms<br>用語                        |
| Basic theory and<br>referenced knowledge<br>of inspection method<br>試験方法の原理と関連知識 | 1.50                               | 0.00            | Surface chemistry<br>界面化学         | Surface tension<br>界面張力                      |
|                                                                                  |                                    |                 |                                   | Wetting ability<br>ぬれ                        |
|                                                                                  |                                    |                 |                                   | Viscosity<br>粘性                              |
|                                                                                  |                                    |                 |                                   | Bleed out<br>にじみ出し                           |
|                                                                                  |                                    |                 |                                   | Capillary action<br>毛管現象                     |
|                                                                                  |                                    |                 |                                   | Emulsification<br>乳化                         |
|                                                                                  |                                    |                 | Eyesight<br>視知覚                   | Eye structure<br>目の構造                        |
|                                                                                  |                                    |                 |                                   | Eye adaptation<br>順応（暗所視，明所視）                |
|                                                                                  |                                    |                 |                                   | Visibility curve<br>視感度曲線                    |
|                                                                                  |                                    |                 |                                   | Color perception<br>色の知覚                     |

## Appendix 9

## PTレベル1初回訓練用シラバス 一般 Penetrant Testing Level 1 Initial Training Syllabus General

| Subject<br>訓練内容                                                                          | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目                                                                                                    | Detail<br>訓練内容詳細                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------------|------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                          | Classroom<br>講義                    | Practical<br>実習 |                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                          |                                    |                 | Characteristics of penetrant materials<br>浸透探傷剤の特性                                                                          | Cleaner<br>前処理剤<br>Penetrant liquid<br>浸透液<br>Remover<br>除去液<br>Emulsifier<br>乳化剤<br>Developer<br>現像剤<br>Water aerosol<br>水エアゾール                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Knowledge of component and production, and capability of technology<br>製品知識および製法とその技術の能力 | 1.00                               | 0.50            | Scope and inspection summary<br>適用範囲と操作手順<br><br>Inspection (Production process and detection of defects)<br>探傷の実際(製法と発生きず) | Subject (size of defect, type of specimen, environment condition) and inspection method<br>対象項目 (きずの大きさ, 試験体の種類, 環境条件)と探傷方法<br>Water washable penetrant inspection<br>水洗性浸透探傷試験<br>Post emulsified penetrant inspection<br>後乳化性浸透探傷試験<br>Solvent removable penetrant inspection<br>溶剤除去性浸透探傷試験<br>Cleaning/Degrease, penetrant process, emulsification process, washing, developing, drying inspection, re-inspection and post cleaning<br>前処理, 浸透処理, 乳化処理, 除去処理, 洗浄処理, 現像処理, 乾燥処理, 観察, 再試験, 後処理<br>Inspection for production and maintenance<br>製造検査と保守検査 |

## Appendix 9

## PTレベル1初回訓練用シラバス 一般 Penetrant Testing Level 1 Initial Training Syllabus General

| Subject<br>訓練内容                                  | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目                                      | Detail<br>訓練内容詳細                                                                                                                                                                                                            |
|--------------------------------------------------|------------------------------------|-----------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                  | Classroom<br>講義                    | Practical<br>実習 |                                                               |                                                                                                                                                                                                                             |
|                                                  |                                    |                 |                                                               | Defects of Manufacturing Process (Forging, Casting, Rolling, Welding, machined component, etc.)<br>製法 (鍛鋼品, 鋳鋼品, 圧延品, 溶接, 二次加工品等)による代表的なきず<br><br>Apply for specialized environment and specialized part<br>特殊環境下及び特殊部品への適用 |
| Equipment<br>装置                                  | 1.00                               | 1.00            | Structure and Handling of Tool and equipment<br>装置および器具の構成と取扱 | Electrostatic system<br>静電気システム                                                                                                                                                                                             |
|                                                  |                                    |                 |                                                               | Cleaning/Degrease equipment, Penetrant booth, Emulsifier booth, Oven dryer, Developing booth, Inspection booth and Post Cleaning equipment<br>前処理装置, 浸透装置, 乳化装置, 洗浄装置, 乾燥装置, 現像装置, 検査室, 後処理装置                               |
|                                                  |                                    |                 |                                                               | Aerosol<br>エアゾールスプレー缶                                                                                                                                                                                                       |
|                                                  |                                    |                 |                                                               | UV light, UV light meter, White light meter, Reflect meter<br>ブラックライト, 紫外線強度計, 照度計 屈折計                                                                                                                                      |
|                                                  |                                    |                 | Reference test piece<br>対比試験片                                 | Purpose and using method<br>使用目的および使用方法                                                                                                                                                                                     |
|                                                  |                                    |                 |                                                               | Type and structure<br>種類と構造 (アルミ焼き割れ試験片, メッキ割れ試験片, 星状割れ試験片)                                                                                                                                                                 |
| General information prior to inspection<br>試験前情報 | 0.50                               | 0.50            | Information of specimen<br>試験体に関する情報                          | Preparation of work instruction<br>指示書の準備                                                                                                                                                                                   |
|                                                  |                                    |                 |                                                               | Material, size and area of application<br>材料, 寸法, 応用分野                                                                                                                                                                      |
|                                                  |                                    |                 |                                                               | Type of defect<br>きずの種類                                                                                                                                                                                                     |
|                                                  |                                    |                 | Process condition<br>試験条件                                     | Preparation for inspection (environment, surface condition inspection area)<br>試験準備 (試験環境, 表面状態, 探傷範囲)                                                                                                                      |

## Appendix 9

## PTレベル1初回訓練用シラバス 一般 Penetrant Testing Level 1 Initial Training Syllabus General

| Subject<br>訓練内容            | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目                  | Detail<br>訓練内容詳細                                                                         |
|----------------------------|------------------------------------|-----------------|-------------------------------------------|------------------------------------------------------------------------------------------|
|                            | Classroom<br>講義                    | Practical<br>実習 |                                           |                                                                                          |
|                            |                                    |                 |                                           | Check of materials<br>探傷剤の確認                                                             |
|                            |                                    |                 |                                           | Standard and Code<br>規格とコード                                                              |
|                            |                                    |                 | Inspection condition<br>観察条件 (JIS Z 2323) | UV light intensity and white light intensity of inspection surface<br>試験面の明るさ, 試験面の紫外線強度 |
|                            |                                    |                 |                                           | Ambient white light intensity of inspection room<br>検査室の明るさ (暗さ)                         |
| Inspection process<br>探傷試験 |                                    |                 | Selection of inspection method<br>試験方法の選定 | Apply inspection operation and purpose<br>検査の時期と目的                                       |
|                            |                                    |                 |                                           | Discontinuity and process condition<br>対象きずと試験条件                                         |
|                            |                                    |                 |                                           | Preparation of procedure (instruction)<br>手順書 (指示書)の準備                                   |
|                            |                                    |                 | Degrease/Cleaning<br>前処理                  | Purpose of degrease/cleaning<br>前処理の目的                                                   |
|                            |                                    |                 |                                           | type of contamination and removing method<br>汚れの種類と除去方法                                  |
|                            |                                    |                 |                                           | Effect of surface roughness<br>表面粗さの影響                                                   |
|                            |                                    |                 | Penetrant process<br>浸透処理                 | Penetrant application method<br>浸透方法(塗布方法)                                               |
|                            |                                    |                 |                                           | temperature and penetrant time<br>温度と浸透時間                                                |
|                            |                                    |                 | Emulsification<br>乳化処理                    | Type of emulsifier (Lipophilic, Hydrophilic)<br>乳化剤の種類 (油ベース, 水ベース)                      |
|                            |                                    |                 |                                           | Emulsifier application method and emulsified time<br>乳化方法, 乳化時間                          |
|                            |                                    |                 |                                           | Stop the emulsification time, pre-washing<br>乳化停止, 予備水洗                                  |

## Appendix 9

## PTレベル1初回訓練用シラバス 一般 Penetrant Testing Level 1 Initial Training Syllabus General

| Subject<br>訓練内容                | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目     | Detail<br>訓練内容詳細                                            |
|--------------------------------|------------------------------------|-----------------|------------------------------|-------------------------------------------------------------|
|                                | Classroom<br>講義                    | Practical<br>実習 |                              |                                                             |
|                                | 1.50                               | 4.00            | Washing process<br>洗浄処理      | Wash method and instruction<br>洗浄方法と手順                      |
|                                |                                    |                 |                              | Water pressure of nozzle<br>ノズルの水圧                          |
|                                |                                    |                 | Removing process<br>除去処理     | Remove method and instruction<br>除去方法と手順                    |
|                                |                                    |                 |                              | Check of remove finish<br>除去終了の確認                           |
|                                |                                    |                 | Developing process<br>現像処理   | Type and application method of developer<br>現像方法の種類と適用方法    |
|                                |                                    |                 |                              | Developing time and indication form<br>現像時間と指示模様の形成         |
|                                |                                    |                 |                              | Combination with penetrant liquid<br>浸透液との組合せ               |
|                                |                                    |                 | Drying process<br>乾燥処理       | Purpose of drying<br>乾燥の目的                                  |
|                                |                                    |                 |                              | Drying method, time and temperature<br>乾燥方法, 乾燥時間および乾燥温度    |
|                                |                                    |                 | Re-inspection<br>再試験         | Purpose of re-inspection<br>再試験の目的                          |
|                                |                                    |                 |                              | Re-inspection method and instruction<br>方法および手順             |
|                                |                                    |                 | Post cleaning<br>後処理         | Need for post cleaning<br>後処理の必要性                           |
|                                |                                    |                 |                              | Post cleaning method and instruction<br>方法および手順             |
| Evaluation and Report<br>評価と報告 |                                    |                 | Basic of evaluation<br>評価の基本 | Inspection condition per JIS Z 2323<br>JIS Z 2323による観察条件    |
|                                |                                    |                 |                              | Reference test piece per JIS Z 2343-3<br>JISZ2343-3による対比試験片 |

## Appendix 9

## PTレベル1初回訓練用シラバス 一般 Penetrant Testing Level 1 Initial Training Syllabus General

| Subject<br>訓練内容                           | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目                                                         | Detail<br>訓練内容詳細                                                                                             |
|-------------------------------------------|------------------------------------|-----------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
|                                           | Classroom<br>講義                    | Practical<br>実習 |                                                                                  |                                                                                                              |
|                                           | 0.50                               | 0.50            | Interpretation of indication<br>指示模様の解釈                                          | Factor of indication<br>指示模様の発生原因                                                                            |
|                                           |                                    |                 |                                                                                  | Relevant indication and Non-relevant indication<br>評価対象指示模様と評価対象外指示模様（疑似模様）                                  |
|                                           |                                    |                 | Evaluation<br>評価                                                                 | Check/Identification of indication, judge the accept/reject per acceptance criteria<br>指示模様の確認・判別，基準に従った合否判定 |
|                                           |                                    |                 | Report<br>報告                                                                     | Inspection result (record of defect)<br>探傷結果（きずの記録）                                                          |
|                                           |                                    |                 |                                                                                  | Inspection condition<br>試験条件                                                                                 |
| Effect for defects on components<br>きずの影響 | 0.50                               | 0.50            | Evaluation of Defects (effect of manufacturing and materials)<br>きずの評価（製造と材料の影響） | Each Defects and shape of indications<br>各種きずと指示模様の形状                                                        |
|                                           |                                    |                 |                                                                                  | Stress condition of part<br>部品の応力条件（許容応力）                                                                    |
|                                           |                                    |                 |                                                                                  | Direction and location of defect<br>きずの方向と発生個所                                                               |
|                                           |                                    |                 |                                                                                  | Affected level of damage<br>破損による被害の影響度                                                                      |
| Quality Control<br>品質管理                   | 0.50                               | 0.50            | Control item<br>管理すべき事項                                                          | Certificate of NDT personnel (JIS Z 2305)<br>技術者の資格(JIS Z 2305)                                              |
|                                           |                                    |                 |                                                                                  | Check/Control of tool<br>機材の確認・管理                                                                            |
|                                           |                                    |                 |                                                                                  | Preparation of instruction<br>指示書の準備                                                                         |
|                                           |                                    |                 |                                                                                  | Applicable NDT method and review of component standard<br>適用可能なNDT方法と製品規格のレビュー                               |
| Safety and Health<br>環境および安全              |                                    |                 | SDS<br>安全衛生（安全データシート）                                                            | Dispose of chemicals<br>化学薬品の処置                                                                              |

Appendix 9  
PTレベル1初回訓練用シラバス 一般 Penetrant Testing Level 1 Initial Training Syllabus General

| Subject<br>訓練内容 | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目 | Detail<br>訓練内容詳細                                                                   |
|-----------------|------------------------------------|-----------------|--------------------------|------------------------------------------------------------------------------------|
|                 | Classroom<br>講義                    | Practical<br>実習 |                          |                                                                                    |
|                 | 0.50                               | 0.50            |                          | Work environment<br>作業環境 (喚起, 火気, 廃液等)                                             |
|                 |                                    |                 |                          | Handling of UV light<br>ブラックライト取扱                                                  |
|                 |                                    |                 |                          | Permissible concentration of particles<br>粉じんの許容濃度                                 |
|                 |                                    |                 | Materials<br>探傷剤         | Classification, volume and flash point per fire service law<br>消防法による分類と指示数量および引火点 |
|                 |                                    |                 |                          | Wastewater treatment<br>廃水処理 (活性炭法, ろ過法)                                           |
|                 |                                    |                 |                          | Control of aerosol material<br>エアゾール製品の管理                                          |
| Total<br>計      | 8.00                               | 8.00            | 16.00                    |                                                                                    |

## Appendix 10

## PTレベル1初回訓練用シラバス 専門 Penetrant Testing Level 1 Initial Training Syllabus Specific

| Subject<br>訓練内容                                                      | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目                                                                                                 | Detail<br>訓練内容詳細                                                                                                                                                                                   |
|----------------------------------------------------------------------|------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                      | Classroom<br>講義                    | Practical<br>実習 |                                                                                                                          |                                                                                                                                                                                                    |
| Safety<br>安全                                                         | 0.25                               | 0.25            | Operation safety<br>安全作業                                                                                                 | Handling of electrical component and hazardous material<br>電気機器と薬品の取扱い                                                                                                                             |
| Qualification System<br>認定制度                                         | 1.00                               | 0.00            | Necessity and structure of<br>Qualification and Certification<br>system<br>認定制度の必要性とそのしくみ                                | What is NAS 410?<br>NAS410とは                                                                                                                                                                       |
|                                                                      | 0.50                               | 0.00            | Flight safety<br>飛行安全                                                                                                    | Example of a serious accident, Affected level of damage<br>重大事故事例, 破損による被害の影響度                                                                                                                     |
|                                                                      | 0.50                               | 0.00            | Code of Ethics<br>倫理規定                                                                                                   | Integrity for NDT inspector<br>検査員の心得                                                                                                                                                              |
| Specific knowledge of<br>PT for Aerospace<br>航空宇宙における浸透探<br>傷試験の専門知識 | 0.50                               | 0.00            | Purpose and terms for NDT<br>NDTの目的, 用語                                                                                  | Purpose for NDT, and summery of each method<br>NDTの目的, 各探傷方法の概要                                                                                                                                    |
|                                                                      | 0.50                               | 0.00            | Advantage and Disadvantage of<br>PT Method<br>浸透探傷試験の長所および短所                                                             | Water washable penetrant, Hydrophilic post emulsified penetrant,<br>Solvent removable penetrant, Dry developer and Non-aqueous wet<br>developer<br>水洗性浸透探傷, 後乳化性浸透探傷, 溶剤除去性浸透探傷, 乾式現像剤, 速<br>乾式現像剤 |
|                                                                      | 0.50                               | 0.00            | Applicable Specifications and<br>Inspection / Work Instructions<br>適用スペック, 検査指示書/指導票                                     | ASTM E1417, Prepared instruction<br>ASTM E1417, 指示書作成                                                                                                                                              |
|                                                                      | 1.00                               | 1.00            | Type of Defects for Part<br>Configuration, Material,<br>Manufacturing and Maintenance<br>部品形状, 材料, 製造または保守管理<br>で検出されるきず | Type of detects, shape and size of discontinuities on Aerospace<br>parts/components<br>航空宇宙製品のきずの種類, 不連続の形状および寸法                                                                                   |
|                                                                      | 0.50                               | 1.00            | Importance of Regular Control<br>定期管理の重要性                                                                                | Detection capability<br>検出能力                                                                                                                                                                       |

## Appendix 10

## PTレベル1初回訓練用シラバス 専門 Penetrant Testing Level 1 Initial Training Syllabus Specific

| Subject<br>訓練内容 | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目                                              | Detail<br>訓練内容詳細                                                                |
|-----------------|------------------------------------|-----------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------|
|                 | Classroom<br>講義                    | Practical<br>実習 |                                                                       |                                                                                 |
|                 | 0.50                               | 1.00            | Importance of Transaction Procedure and Parameter<br>処理手順と処理パラメータの重要性 | Compliance of instruction, Effect of detection<br>指示書の遵守, 検出結果への影響              |
|                 | 0.50                               | 1.00            | Operation, Control and Standardization of Equipment's<br>装置の操作と管理と標準化 | Operation procedure, maintenance<br>操作方法, メンテナンス                                |
|                 | 0.00                               | 1.00            | Process Control<br>工程管理                                               | Check the materials and equipment's, Calibration for gauges<br>探傷材料・設備の点検と計器の校正 |
|                 |                                    |                 |                                                                       | Importance of process control<br>工程管理の重要性                                       |
|                 | 0.00                               | 1.00            | Inspection and Detection of Defects / Documentation<br>検査およびきずの検出・文書化 | Relevant / Non-relevant indication, inspection report/record<br>関係/無関係指示, 記録の作成 |
| Total<br>計      | 6.25                               | 6.25            | 12.50                                                                 |                                                                                 |

## Appendix 11

## PT レベル2初回訓練用シラバス 一般 Penetrant Testing Level 2 Initial Training Syllabus General

| Subject<br>訓練内容                                                                  | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目          | Detail<br>訓練内容詳細                             |
|----------------------------------------------------------------------------------|------------------------------------|-----------------|-----------------------------------|----------------------------------------------|
|                                                                                  | Classroom<br>講義                    | Practical<br>実習 |                                   |                                              |
| Introduction<br>序論                                                               | 0.50                               | 0.00            | General knowledge of NDT<br>NDT一般 | Purpose of penetrant inspection<br>浸透探傷試験の目的 |
|                                                                                  |                                    |                 |                                   | Discontinuity and defect<br>不連続部ときず          |
|                                                                                  |                                    |                 |                                   | General shape of defect<br>きずの基本形状           |
|                                                                                  |                                    |                 |                                   | Words and terms<br>用語                        |
| Basic theory and<br>referenced knowledge<br>of inspection method<br>試験方法の原理と関連知識 | 1.50                               | 0.00            | Surface chemistry<br>界面化学         | Surface tension<br>界面張力                      |
|                                                                                  |                                    |                 |                                   | Wetting ability<br>ぬれ                        |
|                                                                                  |                                    |                 |                                   | Viscosity<br>粘性                              |
|                                                                                  |                                    |                 |                                   | Bleed out<br>にじみ出し                           |
|                                                                                  |                                    |                 |                                   | Capillary action<br>毛管現象                     |
|                                                                                  |                                    |                 |                                   | Emulsification<br>乳化                         |
|                                                                                  |                                    |                 | Eyesight<br>視知覚                   | Eye structure<br>目の構造                        |
|                                                                                  |                                    |                 |                                   | Eye adaptation<br>順応（暗所視，明所視）                |
|                                                                                  |                                    |                 |                                   | Visibility curve<br>視感度曲線                    |
|                                                                                  |                                    |                 |                                   | Color perception<br>色の知覚                     |

## Appendix 11

## PT レベル2初回訓練用シラバス 一般 Penetrant Testing Level 2 Initial Training Syllabus General

| Subject<br>訓練内容                                                                          | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目                                                   | Detail<br>訓練内容詳細                                                                                                                                                                               |
|------------------------------------------------------------------------------------------|------------------------------------|-----------------|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                          | Classroom<br>講義                    | Practical<br>実習 |                                                                            |                                                                                                                                                                                                |
|                                                                                          |                                    |                 | Characteristics of penetrant materials<br>浸透探傷剤の特性                         | Cleaner<br>前処理剤                                                                                                                                                                                |
|                                                                                          |                                    |                 |                                                                            | Penetrant liquid<br>浸透液                                                                                                                                                                        |
|                                                                                          |                                    |                 |                                                                            | Remover<br>除去液                                                                                                                                                                                 |
|                                                                                          |                                    |                 |                                                                            | Emulsifier<br>乳化剤                                                                                                                                                                              |
|                                                                                          |                                    |                 |                                                                            | Developer<br>現像剤                                                                                                                                                                               |
|                                                                                          |                                    |                 |                                                                            | Water aerosol<br>水エアゾール                                                                                                                                                                        |
|                                                                                          |                                    |                 |                                                                            |                                                                                                                                                                                                |
| Knowledge of component and production, and capability of technology<br>製品知識および製法とその技術の能力 | 1.00                               | 0.50            | Scope and inspection summary<br>適用範囲と操作手順                                  | Subject (size of defect, type of specimen, environment condition) and inspection method<br>対象項目 (きずの大きさ, 試験体の種類, 環境条件)と探傷方法                                                                    |
|                                                                                          |                                    |                 |                                                                            | Water washable penetrant inspection<br>水洗性浸透探傷試験                                                                                                                                               |
|                                                                                          |                                    |                 |                                                                            | Post emulsified penetrant inspection<br>後乳化性浸透探傷試験                                                                                                                                             |
|                                                                                          |                                    |                 |                                                                            | Solvent removable penetrant inspection<br>溶剤除去性浸透探傷試験                                                                                                                                          |
|                                                                                          |                                    |                 |                                                                            | Cleaning/Degrease, penetrant process, emulsification process, washing, developing, drying inspection, re-inspection and post cleaning<br>前処理, 浸透処理, 乳化処理, 除去処理, 洗浄処理, 現像処理, 乾燥処理, 観察, 再試験, 後処理 |
|                                                                                          |                                    |                 | Inspection (Production process and detection of defects)<br>探傷の実際(製法と発生きず) | Inspection for production and maintenance<br>製造検査と保守検査                                                                                                                                         |

## Appendix 11

## PT レベル2初回訓練用シラバス 一般 Penetrant Testing Level 2 Initial Training Syllabus General

| Subject<br>訓練内容                                     | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目                                      | Detail<br>訓練内容詳細                                                                                                                                                                                                        |
|-----------------------------------------------------|------------------------------------|-----------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                     | Classroom<br>講義                    | Practical<br>実習 |                                                               | Defects of Manufacturing Process (Forging, Casting, Rolling, Welding, machined component, etc.)<br>製法 (鍛鋼品, 鋳鋼品, 圧延品, 溶接, 二次加工品等)による代表的なきず<br>Apply for specialized environment and specialized part<br>特殊環境下及び特殊部品への適用 |
| Equipment<br>装置                                     | 1.00                               | 1.00            | Structure and Handling of Tool and equipment<br>装置および器具の構成と取扱 | Electrostatic system<br>静電気システム                                                                                                                                                                                         |
|                                                     |                                    |                 |                                                               | Cleaning/Degrease equipment, Penetrant booth, Emulsifier booth, Oven dryer, Developing booth, Inspection booth and Post Cleaning equipment<br>前処理装置, 浸透装置, 乳化装置, 洗浄装置, 乾燥装置, 現像装置, 検査室, 後処理装置                           |
|                                                     |                                    |                 |                                                               | Aerosol<br>エアゾールスプレー缶                                                                                                                                                                                                   |
|                                                     |                                    |                 |                                                               | UV light, UV light meter, White light meter, Reflect meter<br>ブラックライト, 紫外線強度計, 照度計 屈折計                                                                                                                                  |
|                                                     |                                    |                 | Reference test piece<br>対比試験片                                 | Purpose and using method<br>使用目的および使用方法<br>Type and structure<br>種類と構造 (アルミ焼き割れ試験片, メッキ割れ試験片, 星状割れ試験片)                                                                                                                  |
| General information<br>prior to inspection<br>試験前情報 | 0.50                               | 0.50            | Information of specimen<br>試験体に関する情報                          | Preparation of work instruction<br>指示書の準備                                                                                                                                                                               |
|                                                     |                                    |                 |                                                               | Material, size and area of application<br>材料, 寸法, 応用分野                                                                                                                                                                  |
|                                                     |                                    |                 |                                                               | Type of defect<br>きずの種類                                                                                                                                                                                                 |
|                                                     |                                    |                 | Process condition<br>試験条件                                     | Preparation for inspection (environment, surface condition inspection area)<br>試験準備 (試験環境, 表面状態, 探傷範囲)                                                                                                                  |

## Appendix 11

## PT レベル2初回訓練用シラバス 一般 Penetrant Testing Level 2 Initial Training Syllabus General

| Subject<br>訓練内容            | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目                  | Detail<br>訓練内容詳細                                                                         |
|----------------------------|------------------------------------|-----------------|-------------------------------------------|------------------------------------------------------------------------------------------|
|                            | Classroom<br>講義                    | Practical<br>実習 |                                           |                                                                                          |
| Inspection process<br>探傷試験 |                                    |                 |                                           | Check of materials<br>探傷剤の確認                                                             |
|                            |                                    |                 |                                           | Standard and Code<br>規格とコード                                                              |
|                            |                                    |                 |                                           | Inspection condition<br>観察条件 (JIS Z 2323)                                                |
|                            |                                    |                 |                                           | UV light intensity and white light intensity of inspection surface<br>試験面の明るさ, 試験面の紫外線強度 |
|                            |                                    |                 |                                           | Ambient white light intensity of inspection room<br>検査室の明るさ (暗さ)                         |
|                            |                                    |                 | Selection of inspection method<br>試験方法の選定 | Apply inspection operation and purpose<br>検査の時期と目的                                       |
|                            |                                    |                 |                                           | Discontinuity and process condition<br>対象きずと試験条件                                         |
|                            |                                    |                 |                                           | Preparation of procedure (instruction)<br>手順書 (指示書)の準備                                   |
|                            |                                    |                 | Degrease/Cleaning<br>前処理                  | Purpose of degrease/cleaning<br>前処理の目的                                                   |
|                            |                                    |                 |                                           | type of contamination and removing method<br>汚れの種類と除去方法                                  |
|                            |                                    |                 |                                           | Effect of surface roughness<br>表面粗さの影響                                                   |
|                            |                                    |                 | Penetrant process<br>浸透処理                 | Penetrant application method<br>浸透方法(塗布方法)                                               |
|                            |                                    |                 |                                           | temperature and penetrant time<br>温度と浸透時間                                                |
|                            |                                    |                 | Emulsification<br>乳化処理                    | Type of emulsifier (Lipophilic, Hydrophilic)<br>乳化剤の種類 (油ベース, 水ベース)                      |
|                            |                                    |                 |                                           | Emulsifier application method and emulsified time<br>乳化方法, 乳化時間                          |
|                            |                                    |                 |                                           | Stop the emulsification time, pre-washing<br>乳化停止, 予備水洗                                  |

| Subject<br>訓練内容                | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目     | Detail<br>訓練内容詳細                                            |
|--------------------------------|------------------------------------|-----------------|------------------------------|-------------------------------------------------------------|
|                                | Classroom<br>講義                    | Practical<br>実習 |                              |                                                             |
|                                | 1.50                               | 4.00            | Washing process<br>洗浄処理      | Wash method and instruction<br>洗浄方法と手順                      |
|                                |                                    |                 |                              | Water pressure of nozzle<br>ノズルの水圧                          |
|                                |                                    |                 | Removing process<br>除去処理     | Remove method and instruction<br>除去方法と手順                    |
|                                |                                    |                 |                              | Check of remove finish<br>除去終了の確認                           |
|                                |                                    |                 | Developing process<br>現像処理   | Type and application method of developer<br>現像方法の種類と適用方法    |
|                                |                                    |                 |                              | Developing time and indication form<br>現像時間と指示模様の形成         |
|                                |                                    |                 |                              | Combination with penetrant liquid<br>浸透液との組合せ               |
|                                |                                    |                 | Drying process<br>乾燥処理       | Purpose of drying<br>乾燥の目的                                  |
|                                |                                    |                 |                              | Drying method, time and temperature<br>乾燥方法, 乾燥時間および乾燥温度    |
|                                |                                    |                 | Re-inspection<br>再試験         | Purpose of re-inspection<br>再試験の目的                          |
|                                |                                    |                 |                              | Re-inspection method and instruction<br>方法および手順             |
|                                |                                    |                 | Post cleaning<br>後処理         | Need for post cleaning<br>後処理の必要性                           |
|                                |                                    |                 |                              | Post cleaning method and instruction<br>方法および手順             |
| Evaluation and Report<br>評価と報告 |                                    |                 | Basic of evaluation<br>評価の基本 | Inspection condition per JIS Z 2323<br>JIS Z 2323による観察条件    |
|                                |                                    |                 |                              | Reference test piece per JIS Z 2343-3<br>JISZ2343-3による対比試験片 |

## Appendix 11

## PT レベル2初回訓練用シラバス 一般 Penetrant Testing Level 2 Initial Training Syllabus General

| Subject<br>訓練内容                           | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目                                                         | Detail<br>訓練内容詳細                                                                                             |
|-------------------------------------------|------------------------------------|-----------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
|                                           | Classroom<br>講義                    | Practical<br>実習 |                                                                                  |                                                                                                              |
|                                           | 0.50                               | 0.50            | Interpretation of indication<br>指示模様の解釈                                          | Factor of indication<br>指示模様の発生原因                                                                            |
|                                           |                                    |                 |                                                                                  | Relevant indication and Non-relevant indication<br>評価対象指示模様と評価対象外指示模様（疑似模様）                                  |
|                                           |                                    |                 | Evaluation<br>評価                                                                 | Check/Identification of indication, judge the accept/reject per acceptance criteria<br>指示模様の確認・判別，基準に従った合否判定 |
|                                           |                                    |                 | Report<br>報告                                                                     | Inspection result (record of defect)<br>探傷結果（きずの記録）                                                          |
|                                           |                                    |                 |                                                                                  | Inspection condition<br>試験条件                                                                                 |
| Effect for defects on components<br>きずの影響 | 0.50                               | 0.50            | Evaluation of Defects (effect of manufacturing and materials)<br>きずの評価（製造と材料の影響） | Each Defects and shape of indications<br>各種きずと指示模様の形状                                                        |
|                                           |                                    |                 |                                                                                  | Stress condition of part<br>部品の応力条件（許容応力）                                                                    |
|                                           |                                    |                 |                                                                                  | Direction and location of defect<br>きずの方向と発生個所                                                               |
|                                           |                                    |                 |                                                                                  | Affected level of damage<br>破損による被害の影響度                                                                      |
| Quality Control<br>品質管理                   | 0.50                               | 0.50            | Control item<br>管理すべき事項                                                          | Certificate of NDT personnel (JIS Z 2305)<br>技術者の資格(JIS Z 2305)                                              |
|                                           |                                    |                 |                                                                                  | Check/Control of tool<br>機材の確認・管理                                                                            |
|                                           |                                    |                 |                                                                                  | Preparation of instruction<br>指示書の準備                                                                         |
|                                           |                                    |                 |                                                                                  | Applicable NDT method and review of component standard<br>適用可能なNDT方法と製品規格のレビュー                               |
| Safety and Health<br>環境および安全              |                                    |                 | SDS<br>安全衛生（安全データシート）                                                            | Dispose of chemicals<br>化学薬品の処置                                                                              |

Appendix 11

PT レベル2初回訓練用シラバス 一般 Penetrant Testing Level 2 Initial Training Syllabus General

| Subject<br>訓練内容 | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目 | Detail<br>訓練内容詳細                                                                   |
|-----------------|------------------------------------|-----------------|--------------------------|------------------------------------------------------------------------------------|
|                 | Classroom<br>講義                    | Practical<br>実習 |                          |                                                                                    |
|                 | 0.50                               | 0.50            |                          | Work environment<br>作業環境 (喚起, 火気, 廃液等)                                             |
|                 |                                    |                 |                          | Handling of UV light<br>ブラックライト取扱                                                  |
|                 |                                    |                 |                          | Permissible concentration of particles<br>粉じんの許容濃度                                 |
|                 |                                    |                 | Materials<br>探傷剤         | Classification, volume and flash point per fire service law<br>消防法による分類と指示数量および引火点 |
|                 |                                    |                 |                          | Wastewater treatment<br>廃水処理 (活性炭法, ろ過法)                                           |
|                 |                                    |                 |                          | Control of aerosol material<br>エアゾール製品の管理                                          |
| Total<br>計      | 8.00                               | 8.00            | 16.00                    |                                                                                    |

## Appendix 12

## PTレベル2初回訓練用シラバス 専門 Penetrant Testing Level 2 Initial Training Syllabus Specific

| Subject<br>訓練内容                                                      | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目                                                                                                 | Detail<br>訓練内容詳細                                                                                                                                                                                   |
|----------------------------------------------------------------------|------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                      | Classroom<br>講義                    | Practical<br>実習 |                                                                                                                          |                                                                                                                                                                                                    |
| Safety<br>安全                                                         | 0.25                               | 0.25            | Operation safety<br>安全作業                                                                                                 | Handling of electrical component and hazardous material<br>電気機器と薬品の取扱い                                                                                                                             |
| Qualification System<br>認定制度                                         | 1.00                               | 0.00            | Necessity and structure of<br>Qualification and Certification<br>system<br>認定制度の必要性とそのしくみ                                | What is NAS 410?<br>NAS410とは                                                                                                                                                                       |
|                                                                      | 0.50                               | 0.00            | Flight safety<br>飛行安全                                                                                                    | Example of a serious accident, Affected level of damage<br>重大事事故事例, 破損による被害の影響度                                                                                                                    |
|                                                                      | 0.50                               | 0.00            | Code of Ethics<br>倫理規定                                                                                                   | Integrity for NDT inspector<br>検査員の心得                                                                                                                                                              |
| Specific knowledge of<br>PT for Aerospace<br>航空宇宙における浸透探<br>傷試験の専門知識 | 0.50                               | 0.00            | Purpose and terms for NDT<br>NDTの目的, 用語                                                                                  | Purpose for NDT, and summery of each method<br>NDTの目的, 各探傷方法の概要                                                                                                                                    |
|                                                                      | 0.50                               | 0.00            | Advantage and Disadvantage of<br>PT Method<br>浸透探傷試験の長所および短所                                                             | Water washable penetrant, Hydrophilic post emulsified penetrant,<br>Solvent removable penetrant, Dry developer and Non-aqueous wet<br>developer<br>水洗性浸透探傷, 後乳化性浸透探傷, 溶剤除去性浸透探傷, 乾式現像剤, 速<br>乾式現像剤 |
|                                                                      | 2.00                               | 1.00            | Applicable Specifications and<br>Inspection / Work Instructions<br>適用スペック, 検査指示書/指導票                                     | ASTM E1417, Prepared instruction<br>ASTM E1417, 指示書作成                                                                                                                                              |
|                                                                      | 1.00                               | 2.00            | Type of Defects for Part<br>Configuration, Material,<br>Manufacturing and Maintenance<br>部品形状, 材料, 製造または保守管理<br>で検出されるきず | Type of detects, shape and size of discontinuities on Aerospace<br>parts/components<br>航空宇宙製品のきずの種類, 不連続の形状および寸法                                                                                   |
|                                                                      | 0.50                               | 1.00            | Importance of Regular Control<br>定期管理の重要性                                                                                | Detection capability<br>検出能力                                                                                                                                                                       |

## Appendix 12

## PTレベル2初回訓練用シラバス 専門 Penetrant Testing Level 2 Initial Training Syllabus Specific

| Subject<br>訓練内容 | Duration [Hours]<br>訓練内容別必要訓練時間(h) |                 | Training Title<br>訓練内容題目                                                 | Detail<br>訓練内容詳細                                                                |
|-----------------|------------------------------------|-----------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------------|
|                 | Classroom<br>講義                    | Practical<br>実習 |                                                                          |                                                                                 |
|                 | 0.50                               | 1.00            | Importance of Transaction<br>Procedure and Parameter<br>処理手順と処理パラメータの重要性 | Compliance of instruction, Effect of detection<br>指示書の遵守, 検出結果への影響              |
|                 | 0.50                               | 2.00            | Operation, Control and<br>Standardization of Equipment's<br>装置の操作と管理と標準化 | Operation procedure, maintenance<br>操作方法, メンテナンス                                |
|                 | 0.00                               | 2.00            | Process Control<br>工程管理                                                  | Check the materials and equipment's, Calibration for gauges<br>探傷材料・設備の点検と計器の校正 |
|                 |                                    |                 |                                                                          | Importance of process control<br>工程管理の重要性                                       |
|                 | 0.00                               | 2.00            | Inspection and Detection of<br>Defects / Documentation<br>検査およびきずの検出・文書化 | Relevant / Non-relevant indication, inspection report/record<br>関係/無関係指示, 記録の作成 |
| Total<br>計      | 7.75                               | 11.25           | 19.00                                                                    |                                                                                 |