Salvagnini America Inc.

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ATTENDANCE SHEET

Class hours: 8:30am – 4:30pm

COURSE NAME Laser Optics Course Certification	COURSE DATES
Company Name: Salvagnini America (Internal Training)	
Trainer: Bill Saavedra	
Machine Serial Number:	
Print Name:	Signature:
Print Name:	Signature:
Print Name:	Signature:
Print Name:	Signature:
Print Name:	Signature:
Print Name:	Signature:
Notes for Customer:	
Location: Salvagnini America Campus	Date:

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Laser Optics Training:

1. Introduction to the Laser Head

1.1 Definition of all Laser head components and their functions

Description	Comments	Check Box
• Fiber • Protective cap • Focus lens • Protective Window • Collimator • 45° mirror • APC • Head body • Peltier • Arnite ring • Diffuser • Capacitive sensor • Ceramic • Nozzle		

1.2 Tools for Cleaning

Description	Comments	Check Box

• Hex Keys
  ○ 2.5mm
  ○ 3mm
  ○ 4mm
• Protective window drawer
• Optic paper 3163050002
• Cleaning swabs 3163050024
• Nitrile gloves
• Alcohol 99.99%
• Acetone 99.99%
• LED flashlight
• Torque wrench for peltier		

• Painters Tape • Tweezers		

1.3 Tools for replacing head

Description	Comments	Check Box

• Hex Keys
  ○ 2.5mm
  ○ 3mm
  ○ 4mm
• Wrenches
  ○ 19mm
  ○ 20mm
  ○ 21mm
• Fiber cap
• Linear guide and bearings
• Torque Wrenches
  ○ 0.8Nm
  ○ 1.0Nm
  ○ 3.0Nm
• M12 torque tool 3999501551
• Shim tape 0.1mm		

2. Before Removing the peltier cell or opening head

2.1 Perform ordinary maintenance of the laser head before modifying cutting parameters.

Description	Comments	Check Box
• Clean all surfaces (external) • Check and clean protective window • Clean capacitive sensor • of the capacitive sensor • Check and clean the nozzle • Check/redo calibration		

• Check condition of the nozzle (ovaling) • Check anomalous modifications (>10%) of parameters for 1xx material with respect to xx base material		

2.2 Technical Checks

Description	Comments	Check Box
• Check service gas flow behavior • Lanny valve test (Startup) • Check air and liquid cooling circuit • Fiber, collimator, Peltier cell, capacitive sensor • Statically check capacitive sensor • Use digital multimeter to check continuity between capacitive sensor and body • Check integrity of Z axis and lens motor Stroke end and torque • Check capacitive sensor with respect to the Z axis • Control interface and UC Scope • Check combiner • Look for static “dark spots” on red pilot laser by moving fiber slightly • Check nozzle • Check BNC connector on log cable; should		

read between 99kΩ – 110kΩ • Check that ARF tool is level (startup manual)		

2.2 Focus Search

Description	Comments	Check Box

• CTM 194 (LM_ZERO)
  ○ Can range between -0.501mm- -1.0mm
  ○ Manual focus search = -0.501mm
  ○ Automatic focus search =-0.567mm
• Close CTMs in order to save values correctly
• After focus search, must check protective window and lens
• AX3 moves up and down while Axa5 stays at -0.501 during focus search
• Generic Actors and Actors		

3. Removing the Peltier Cell

3.1 Operating principles/ removal

Description	Comments	Check Box
• Clean area surrounding Peltier • Unscrew the screws • Remove Peltier		

• Clean area surrounding front cover • Unscrew the screws • Remove front cover		

3.2 Removing the lens holder

Description	Comments	Check Box
• Move Lens into position • Unscrew and remove lens holder • Check optical path with flashlight • Check condition of linear guide • Cover front opening with painter's tape		

4. Cleaning Front Cover and Seal

Description	Comments	Check Box
• Remove front cover, check for damage • Remove seal • Check condition of seal • Clean with alcohol • Blow with N2 • Use LED to ensure cleaning of seal • Refit seal on cover • Position front cover on clean surface		

5. Removing and Cleaning the Focus Lens

Description	Comments	Check Box
• Unscrew the screw • Remove the spring • Remove copper ring • Blow the removed components with Nitrogen • Manually remove the focus lens • Use Nitrogen to blow surface • Clean lens, Follow procedures Illustrated		

6. Cleaning and Installing the Lens-holder

Description	Comments	Check Box

• Clean the following components
  ○ Lens-holder
  ○ Ring nut
  ○ Spring
  ○ Copper ring
• Insert lens into lens holder
• Place copper ring and spring
• Place ring nut
• Screw in screws
• Torque to 1Nm
• Check lens holder with LED, Clean again if needed		

7. Fitting Lens-holder and Cover

Description	Comments	Check Box

• Remove tape/check for residue
• Check optical path is not contaminated
• Insert lens-holder
• Screw in screws
  ○ Torque big screws to 1 Nm
  ○ Torque small screws to 0.8 Nm
• Use optical paper to clean front cover
• Blow surfaces with N2
  ○ Torque big screws to 3 Nm
  ○ Torque small screws to 1 Nm		

8. Fitting the Peltier cell

Description	Comments	Check Box
• Blue thermal pad • White thermal sheet on front cover • Install Peltier cell • Screw in screws with torque of 1 Nm • Use a 0.1mm thickness shim to check gap between Peltier and body		