



School of Thermography

INFRARED THERMOGRAPHY PCN LEVEL 1

TIMETABLE

MONDAY		
Topics	Sub-topics and practical exercises	Time Table
Individual introductions:	Current knowledge of IRT, experience, applications, special interests etc.	09:00
Introduction:	Course format Refreshments Safety Info Battery charging	09:15
Heat Transfer Principles		
Preview of days topics	Introduction to Heat transfer principles	09:20
Introduction to thermography	Introduction to IRT fundamentals (car image)	09:30
Temperature and Heat	Celsius, Fahrenheit, Kelvin (definitions), how these scales evolved and the relationship between temperature and heat.	09:45
Conduction	Conduction Fundamentals - examples Fourier's Law of conductivity Material conductive properties	10:15
Convection	Convection Fundamentals - examples Newton's Law of Cooling Convection properties of gas and liquids	10:45
Radiation	Radiation Fundamentals - examples Electromagnetic spectrum	11:15
Heat transfer examples and discussion	Review some practical examples of heat transfer processes and how these coexist in common situations	11:45
Lunch		13:00
Summary of mornings topics	Questions & Clarification	13:45
Infrared radiation measurement principles	Absorption, Transmission, Reflection Atmospheric transmission, Black body principles, Planck, (Wien & Boltzmann)	14:00
IRT camera operation	Basic point and shoot tuition, thermal tuning (range, level and span), emissivity and focus.	14:45
Practical emissivity and temperature measurement exercises	Determining emissivity and temperature values for different materials and material finishes. Measurement techniques.	15:30
Practical Review	Review of what was learnt and observed during the exercises.	16:45
Heat transfer summary	Clarification / key points/ Question paper	17:00
Finish		17:30



INFRARED THERMOGRAPHY PCN LEVEL 1

TIMETABLE

School of Thermography

TUESDAY

Topics	Sub-topics	Time Table
2. IRT Equipment and Operation		
Review of Mondays topics	Questions & Clarification	09:00
Preview of days topics	Introduction to IRT equipment and operation	09:15
History of IRT equipment	Evolution of thermal imaging systems	09:30
How imagers work	IRT detector theory, scanners, FPA's, microbolometers, infrared radiation thermometer and spot radiometers, lenses and filters.	10:15
Equipment selection criteria	Detectors, temperature sensitivity (NETD), spatial resolution (IFOV), MIFOV, software, SW, LW, ergonomics, build quality, calibration and calibration checks, features and options.	11:00
Support equipment	Digital cameras, printers, computers, temperature probes, general accessories.	12:00
Data archiving	Image formats, storage and archive.	12:30
Lunch		13:00
Summary of mornings topics	Questions & Clarification	13:45
Equipment operation (advanced)	Camera controls and feature familiarisation, zoom, distance, palettes and analysis functions (spot, line area etc.). Practice time.	14:00
How to create a good image	Image and temperature resolution, focus, thermal focus, palette selection, incorrect emissivity, manual and auto operation, object size, spot size, distances, target framing, target perspective.	14:45
IRT Camera and Software Analysis Functions	Practical exercises (use each others face). IRT image analysis using on board analysis tools and computer based software tools	15:30
Image interpretation	General image interpretation guidelines, recognising and dealing with reflections, convection, conduction and emissivity variations.	16:15
IRT Equipment and Operation summary	Clarification / key points/ Question paper	17:00
Finish		17:30



INFRARED THERMOGRAPHY PCN LEVEL 1 TIMETABLE

School of Thermography

WEDNESDAY

Topics	Sub-topics	Time Table
3. Survey Techniques & Image Analysis		
Review of Tuesdays topics	Questions & Clarification	09:00
Preview of mornings topics	Introduction to IRT surveillance	09:15
Pre-survey preparation	Batteries, memory cards, digital camera, temperature probe, high emissivity tape, emissivity tables if not onboard camera, PPE, laptop for onsite reporting.	09:30
On-site preparation	Survey specification and scope, customer expectations - what will be surveyed, what won't, report specifications, SSoW, access, escorts.	10:00
Equipment Set-up (review, plus additions)	Focus, thermal focus (range, span & level), emissivity measurement, sources of high emissivity, recognising the implications of low emissivity targets, time & date, distance, Tref and Tatm measurement, manual/auto, etc.	10:30
Environmental and operational awareness	Environmental changes, Tref, Tatm, reflections, surrounding objects, structures, the sky, solar glare, solar gain, mass transport, precipitation, atmospheric attenuation, error source recognition, prevention and control.	11:15
Temperature changes	Real and apparent temperature changes	12:15
Lunch		13:00
Summary of mornings topics	Questions & Clarification	13:45
Preview of afternoons topics	Introduction to IRT inspection techniques	14:00
Qualitative Evaluation	Defect evaluation through target signature, symmetry and comparison.	14:15
Quantitative Evaluation	Evaluating defects using radiometric and environmental data.	14:45
Defect Assessment	Establishing thermal severity criteria (absolute, Delta, statistical) target temperature evaluation and the problem of reporting non-problems.	15:15
IRT NDT	IRT active and passive inspection	16:00
Condition Monitoring	Maintenance strategy, inspection frequencies, baseline temperatures.	16:15
Integrating technologies	Introducing other CM technologies, VA, AE, oil analysis, strobe and ultrasound. Practical integration policy.	16:30
Survey Techniques & Image Analysis summary	Clarification / key points/ Question paper	17:00
Finish		17:30



School of Thermography

INFRARED THERMOGRAPHY PCN LEVEL 1

TIMETABLE

THURSDAY

Topics	Sub-topics	Time Table
Review of Wednesdays topics	Questions & Clarification	09:00
Introduction to IRT applications	Preview of days topics	09:15
General Applications	Discussion on general industrial applications not covered by the sector topics defined.	09:30
Electrical Engineering applications	Introduction	10:00
Electrical theory	Ohms law and Joules law	10:15
Electrical defect evaluation	Electrical defects associated with HV lines, sub-stations, LV distribution systems, MCC's, switchgear, battery systems, PFC etc	10:45
Mechanical engineering applications	Application introduction	12:00
Mechanical defect evaluation	Mechanical defects associated with motors, pumps, gearboxes, engines, fans, compressors, steam systems, process, etc	12:15
Lunch		13:00
Summary of mornings topics	Questions & Clarification	13:45
Civil engineering applications	Introduction	14:00
Civil defect evaluation	Buildings and Structures. Diffusivity, thermal capacity, concrete de-laminations, corrosion, moisture ingress, air leakage.	14:15
On site IRT surveillance tour	Escorted group survey of Colts engineering facility.	15:15
Review IRT tour	Observations and general discussion	16:30
General Applications Summary	Clarification / key points/ Question paper	17:00
Finish		17:30



INFRARED THERMOGRAPHY PCN LEVEL 1

TIMETABLE

School of Thermography

FRIDAY

Topics	Sub-topics	Time Table
Review of Thursdays topics	Questions & Clarification	09:00
Introduction to days topics	Preview of days topics	09:15
Application Knowledge	Understanding the operating principles and construction of IRT application targets.	09:30
IRT Reports	What a thermographic report should contain. Radiometric and environmental data, format, presentation etc.	10:30
Safety Standards	HSWA; EAW; PUWER; CDM;	11:30
SSoW	Survey and workplace risk assessments, IRT developing written procedures, site conduct.	12:00
Lunch		13:00
Summary of mornings topics	Questions & Clarification	13:45
Competence	The importance of training and experience	14:00
Overview IRT Standards	Introduction to IRT related standards	14:15
Certification Standards	CMGEN, ISO 18436, ISO 17359, 18434, 13379, 13381, general discussion.	14:30
Application standards	BS 7671, ISO 281, Part L Building Regulations	15:00
BINDT & UKTA	Introduction to the organizations, and the importance of their role in developing a national training and certification scheme.	15:30
Review of weeks course	Recap on all topics covered, discussion on key points.	14:00
Reporting and Safety issues Summary	Question paper	15:30
PCN Exam	For those eligible to sit	16:00
Finish		17:30