Chartech Training Academy

How to Optimise your Thermal Process

(2-day course)

Course Overview

This course is adapted to the specific equipment you wish to cover

This intensive, practical course provides participants with a deep understanding of how to optimise thermal processing systems used in the food industry such as ready meals, beverages, pet foods, and canned goods. Combining theory, hands-on analysis, and live simulation activities, the course empowers technical and operational teams to improve programming, critical factors, heating efficiency, product quality, food safety, and energy performance.
Learners will explore real industrial case studies and practice optimisation techniques used by leading food manufacturers worldwide.

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Course Structure

Module 1 — Thermal Processing Fundamentals

- Principles of heat transfer (conduction, convection, mixed modes)
- Product characteristics that influence heating (viscosity, particulates, density, water activity)
- Packaging influence (trays, pouches, cans, glass, bottles)
- Difference between sterilisation, pasteurisation, cooking

Module 2 — Equipment Systems & Their Operating Principles

(Ensuring the Program Matches the Equipment Capabilities)

- Understanding the equipment used to deliver the thermal process
- Critical equipment limitations and how they impact heat transfer
- Matching the program to the equipment's unique heating behaviour

Module 3 — Understanding Critical Factors (A major topic focused on *what matters most* in process development)

- Defining "Critical Factors" for thermal processing
- Product, Process, Packaging, Equipment and Program related Critical Factors- A practical exercise to document them for your process.
- How critical factors interact and influence lethality and quality

Module 4 — Thermal Process Program Development & Programming Improvement (Focus on designing and optimising robust programs)

- Developing a program aligned to:
  ✓ product ✓packaging ✓ equipment ✓ regulatory safety objectives
- Structure of a robust thermal process program: come-up profile, hold structure, pressure/temperature balance, cooling strategy
- Techniques for program optimisation
- Tools for program improvement

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Module 5 — Validation, Lethality & Compliance

- Lethality targets (F_o, PUs, P_o) explained
- How to validate a thermal process
- Cold spot identification
- How to interpret heat penetration curves
- Regulatory expectations (food safety plans, CCPs, deviation handling)

Module 6 — Practical Case Studies

- Uneven oven heating & overprocessing
- Tunnel pasteurisation underperformance
- Viscosity-driven conduction delays
- Fill weight/headspace variation
- Inefficient program development

Module 7 — Live Process Optimisation Simulation Game

- Teams optimise a process using real data
- Respond to live deviations and emergencies

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Benefits of Attending

Participants will gain:

Operational & Technical Benefits

- Improved ability to optimise thermal processes and reduce cycle times
- Enhanced understanding of lethality requirements (F_o, P_o)
- Tools for preventing under processing and overprocessing
- Reduced energy and steam costs through smarter process design
- Greater confidence in troubleshooting performance

Quality & Safety Benefits

- Improved product consistency and sensory quality
- Stronger process control to minimise safety risks
- Better compliance with validation and regulatory guidelines
- Knowledge to reduce customer complaints, spoilage and rework

Organisational Benefits

- Cross-team alignment on process optimisation
- Increased throughput and equipment utilisation
- Lower operational cost per unit
- A more skilled and capable technical workforce

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Who Should Attend?

This course is ideal for professionals working with thermal processing in food and beverage manufacturing, including:

- Process Engineers
- Quality Assurance / Quality Control Managers
- Technical Managers & Technologists
- Production & Operations Supervisors
- R&D & Product Development Teams
- Maintenance Personnel
- Continuous Improvement / Lean Teams
- Plant Managers seeking efficiency improvements

No advanced mathematical experience is required — all concepts are explained clearly and practically.

Learning Outcomes

At the end of the course, participants will be able to:

- Explain how heat moves through different types of products and packaging
- Understand sterilisation/pasteurisation targets and how to calculate lethality
- Identify cold spots and perform effective heat penetration analysis
- Optimise thermal process programs
- Evaluate temperature–time curves and identify improvement opportunities
- Troubleshoot slow heating, overprocessing, container deformation, and other common issues
- Adjust processes in response to variations in viscosity, fill weight, load configuration, or equipment performance

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Applied Competence

- Balance food safety, product quality, and energy efficiency
- Design robust processes that are resilient to deviations
- Apply optimisation principles across thermally processed foods

Your Trainer

Brendan Charles brings over 30 years of experience in the food manufacturing industry, specialising in chilled, frozen, and thermally processed foods. A Lean Six Sigma Black Belt, he has worked for organisations including Best Foods (Unilever), Campbell's Soup Company, Baxter's Food Group, Princes Foods, Ferndale Foods, TSC and Campden BRI.

As founder of Chartech Ltd, he provides specialist consultancy and training in thermal processing, validation, and equipment qualification.
Learn more at www.chartech.co.uk

Course Cost per Delegate

As this course is designed specifically for your facility, please get in touch to find out more about costs. The course fee includes:

- Comprehensive course materials
- Use of TMI-Orion logger systems during the practical sessions
- Use of software where relevant
- No limit to the number that can attend, however we recommend you limit it to a maximum of 12 people to ensure the practical sessions are manageable.

Chartech Ltd also offers three months remote support to all delegates to assist them in their first validation exercise. Please enquire if you would like to add this bolt on to your course.

To book your place or to learn more, please contact Brendan Charles at brendan.charles@chartech.co.uk