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Thermal Calibration and Independent Validation Pilot

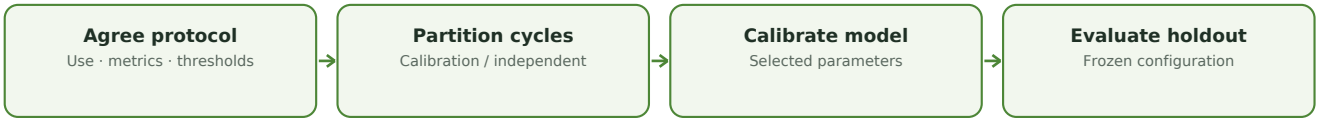
ENGINEERING SERVICE | BC-THERM-03 | S04-V | v1.1 | 12 November 2026

Document type: Service brief and measurement-led evaluation outline.
Purpose: Calibrate selected model parameters and evaluate the frozen configuration on independent operating cycles or conditions.
Typical engagement: 25–50 working days; staged engineering and model-evaluation pilot.

1 Executive summary

BC-THERM-03 is a structured engineering pilot for a customer-specific HPDC thermal model. Selected parameters are calibrated on a designated dataset, after which the model configuration is frozen and evaluated on independent holdout cycles or operating conditions. The engagement connects model outputs to traceable temperature measurements and produces a documented assessment of performance within an agreed operating envelope.

BC-THERM-03: calibration followed by independent evaluation



2 Engineering decision and customer value

The pilot helps determine how well the selected model configuration reproduces measured thermal behavior for the defined process, sensors, and operating envelope. It identifies which outputs and conditions are supported by the evaluation, where residual patterns remain, and what model or measurement work should follow. The result is an evidence-based engineering assessment, not a predetermined pass outcome.

3 Work packages

Work package	Activities	Output
Protocol and data audit	Agree intended use, operating envelope, metrics, thresholds, sensor channels, and data permissions; verify traceability.	Frozen evaluation protocol and data manifest.
Calibration design	Partition complete cycles/conditions; select parameters and bounds; assess sensitivity and identifiability.	Calibration/holdout plan and parameter rationale.
Calibration	Fit selected parameters using designated calibration cycles and document the resulting configuration.	Calibrated parameter set and run provenance.
Independent evaluation	Run the frozen configuration on holdout cycles/conditions; compute pre-agreed metrics and residual summaries.	Independent evaluation report and operating-envelope statement.

4 Deliverables

- Agreed intended use, model boundary, operating envelope, metrics, thresholds, and aggregation rules.
- Traceable data manifest with sensor IDs, positions, units, calibration information, cycle IDs, and partition records.
- Calibration protocol, selected parameter bounds, sensitivity/identifiability notes, and calibrated configuration.
- Frozen model version and reproducible execution manifest.
- Independent holdout evaluation with sensor-level residuals and agreed performance measures.
- Report on supported conditions, residual patterns, uncertainty, and recommended engineering action.
- Versioned configuration and result package for subsequent engineering use or extension.

5 Information used in the engagement

This pilot requires representative, traceable measurements and enough distinct operating cycles or conditions to separate calibration from independent evaluation. Complete cycles or operating conditions are preferred as holdout units when measurements are temporally dependent.

Information	Examples	Evaluation requirement
Intended use	Specific engineering decision and operating envelope.	Agreed before calibration.
Geometry/materials	Die/casting domain, alloy and tool properties, sensor positions.	Consistent with model scope and measurement locations.
Measurement records	Time-stamped thermocouple histories, calibration, uncertainty, sampling interval, units.	Traceable and representative across relevant cycles.
Process context	Cycle phases, initial temperatures, cooling information, operating-condition labels.	Supports grouping and interpretation of the test conditions.
Data partition	Distinct calibration cycles and independent holdout cycles/conditions.	Holdout is reserved before calibration and not used for tuning.

6 Delivery approach and responsibilities

Bamboos Consulting	Customer	Optional specialist partner
Freezes the study protocol and model scope; audits and partitions measurements; calibrates selected parameters; documents identifiability and sensitivity; runs the frozen model on holdout data; computes agreed metrics and packages provenance and findings.	Provides authorized raw measurements and metadata; confirms sensor installation/calibration and process events; identifies representative cycles and operating conditions; agrees the intended use, data partition, metrics, thresholds, and data rights.	Where needed, provides independent sensor calibration, additional instrumentation, geometry preparation, or complementary CAE analysis under a separately agreed scope.

7 Engagement scope and commercial format

Planning element	Indicative definition
Service mapping	S04-V · Thermal Validation Pilot
Indicative effort	25–50 working days (35-day planning baseline). Actual effort depends on data volume, sensor coverage, parameter count, operating-envelope breadth, and evaluation requirements.
Commercial mechanism	Staged engineering pilot with a fixed scope and review gates; additional measurement, geometry, or multiphysics work is separately scoped.
Acceptance and review	Completion of the agreed calibration and independent holdout evaluation, reporting of pre-agreed metrics and residuals, and delivery of the frozen configuration and provenance. The evaluation outcome may support, narrow, or redirect the intended use.

> Next step. Share the intended engineering decision, representative cycle records, sensor metadata, and available geometry/material information. A scoping discussion can establish whether the data support a calibration and independent evaluation pilot.

The final statement of work defines the specific engineering question, data package, model configuration, scenario count, review points, and deliverables. The engagement is tailored to the customer’s process and intended decision.