Final Report

Guardian 900 Saw

Wodonga Rendering Guardian 900 understanding long term benefits of adoption including the use of IOT

Project code
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1.0 Abstract

This project evaluated the multi-year deployment of Guardian smart bandsaws at Wodonga Rendering to reduce hand-laceration risk and establish a data-driven governance model.

Methods combined portal analytics (activations, runtime, and reason codes) with supervisor workshops and injury-register review across Offal, Cutting, and Boning rooms. Over the review period, no lacerations were recorded while operating Guardian saws; activation intensity averaged about two per runtime hour, with “Vision not safe” the dominant trigger, followed by contact sensing and brake events.

Targeted operational improvements—standardising light-coloured PPE to minimise reflective false-positives, mitigating moisture/condensation and lens fogging, enforcing unique operator logins, and specifying right-side/overhead lead routing for future machines—reduced nuisance stops and improved data fidelity.

Maintenance shifted to a self-service model supported by a critical-spares kit, lowering cost and downtime. Governance improvements include a quarterly KPI pack and clarified portal ownership to enable fair operator-level coaching. The project demonstrates a practical pathway to materially lower injury risk while maintaining throughput and provides an evidence base and repeatable reporting cadence to guide adoption, training, maintenance, and procurement decisions across red-meat processing sites.

2.0 Executive summary

Wodonga Rendering deployed Guardian smart bandsaws (400/600/900 classes) across Offal, Cutting and Boning rooms to materially reduce hand-laceration risk and establish a data-driven safety governance model. Over the multi-year review period, no lacerations were recorded while operating Guardian saws; the small number of remaining hand injuries in records relate to legacy equipment. Guardian’s tethering slightly reduces multitasking but improves focus and is strongly preferred from a safety standpoint.

Operational analytics show an average of ~2 activations per runtime hour. The most common trigger is “Vision not safe”, followed by contact sensing and brake events. Investigation linked nuisance stops mainly to reflective blue PPE on wet product and to moisture/condensation causing lens fogging; a temporary rise in “harness disconnected” reflected small crews assisting across stations.

Targeted controls were implemented:

- PPE: Standardise light-coloured aprons; trial non-blue gloves to reduce reflections.
- Environment: Improve compressor/airline management; formalise lens-cleaning routines.
- Systems: Enforce unique operator logins; restore supervisor portal access; stand up a quarterly KPI pack (activations/hour by machine & operator; top reasons; coaching flags).
- Ergonomics & procurement: Prefer right-side/overhead lead routing on new machines; set guidance for lead length and harness care.
- Maintenance: Adopt self-servicing with a critical-spares kit, avoiding high vendor travel costs while keeping downtime low.

Benefits include a demonstrated reduction in laceration risk, faster incident investigation via video, and a light-touch, repeatable analytics cadence that improves coaching, maintenance planning and purchasing decisions. Recommendations are to maintain Guardian as the site standard, continue the quarterly KPI/reporting cycle, complete PPE colour transition, keep unique credentials and spares discipline in place, and embed lead-routing preferences in all future orders.

3.0 Introduction

Bandsaw lacerations are a critical and costly risk in red-meat processing. Traditional blade-stop systems can limit injury severity after contact, but they offer little preventative insight and no reliable operator-level analytics. Guardian smart bandsaws address this gap by combining computer vision, electrical contact sensing and a mandatory operator tether to intervene before hazardous hand-to-blade proximity occurs while recording high-fidelity activation data and video.

Wodonga Rendering deployed Guardian units across Offal, Cutting and Boning rooms (400/600/900 classes) between late-2022 and 2025 to materially reduce injury risk and establish a repeatable, data-driven governance model. The project sought to determine long-term safety performance, quantify operational impacts, identify practical causes of nuisance activations, and define the minimal set of control measures (PPE, environmental, ergonomic and systems) required for stable day-to-day use.

The evaluation integrated multiple evidence streams: Guardian portal analytics (activations, reason codes and runtime), supervisor workshops and on-floor observation, and cross-checks against the site's injury register and management reporting. Prior milestone reports and the final review meeting were used to validate trends over time and to agree ownership for actions such as portal access, unique operator logins, PPE standardisation and maintenance practices.

This Final Report consolidates the multi-year findings, explaining what changed, why it changed, and how those changes can be sustained. It documents safety outcomes, activation patterns and their root causes, the operational adjustments implemented, and the cost/uptime implications of servicing approaches. The intent is to provide a clear, evidence-based basis for continued adoption at Wodonga Rendering and a practical blueprint that other processors can apply with minimal disruption to throughput.

4.0 Project objectives

Project objectives

- **Safety impact:** Quantify and reduce the frequency/severity of bandsaw hand injuries; verify outcomes attributable to Guardian vs legacy saws.
- **Operational performance:** Measure activation intensity (activations/hour), downtime and any throughput effects; identify acceptable operating ranges.
- **Data & governance:** Establish unique operator logins, supervisor portal access and a quarterly KPI pack to enable fair comparisons and targeted coaching.

- **False-positive control:** Identify and mitigate key contributors to nuisance activations (e.g., PPE reflectivity, moisture/condensation, lens fogging).
- **Maintenance model:** Define a cost-effective self-service approach and critical-spares list to minimise downtime and external travel costs.
- **Ergonomics & usability:** Capture learnings on tethering, lead length/routing (prefer right-side/overhead) and harness care; feed into SOPs.
- **Procurement guidance:** Translate site learnings into specifications for future machine orders and retrofits.
- **Adoption playbook:** Produce concise implementation guidance (PPE policy, maintenance routines, reporting cadence) for repeatable rollout across sites.

5.0 Methodology

Study design & scope

- Multi-year operational evaluation (late-2022 → Oct 2025) across Offal, Cutting and Boning rooms.
- Guardian 400/600/900 saws assessed in routine production; no test benching.
- Skin-on goat machine discussion explicitly excluded from scope.

Equipment & configuration

- Standard Guardian hardware (vision + contact sensing + tether) with operator logins enabled.
- Site-standard blades, guards, and wash-down practices retained to reflect real use.

Data sources

- Guardian portal exports: activations, reason codes, runtime, operator, timestamp, machine.
- Injury register (bandsaw-related entries) and FY2025 management reports.
- Milestones 2–4 reports and Final Review workshop notes (operator feedback, actions).

Data preparation

- Deduplication and time-normalisation (activations per runtime hour).
- Reason-code grouping: Vision not safe, Contact sensing, Brake, Harness/Other.
- Identity hygiene: migrate shared logins → unique credentials; remove departed staff.
- Room/machine stratification (Offal vs Cutting vs Boning; 400/600/900 class).

Primary metrics

- Safety: lacerations on Guardian vs legacy saws; severity where applicable.
- Performance: activations/hour; distribution by reason code; downtime proxies (where noted).

- Adoption quality: share of operators with unique logins; portal access reliability.

Analysis approach

- Descriptive stats and trend lines (monthly/quarterly) by room, machine class, operator.
- Comparative review of activation patterns before/after interventions (PPE, moisture fixes).
- Video spot-checks for high-activation outliers to confirm root causes.

Operator engagement

- Supervisor/operator workshops to validate findings and co-design controls.
- Targeted coaching plans based on operator-level profiles (post-unique-login rollout).

Interventions & trials

- PPE colour standardisation (white aprons; trial non-blue gloves).
- Moisture management (compressor/airline maintenance; lens cleaning routines).
- Ergonomics (lead length checks; right-side/overhead routing captured for new POs).
- Maintenance shift to self-service + critical spares; document alignment procedures.

Governance & reporting

- Establish quarterly KPI pack (activations/hour by machine/operator; top reasons; coaching flags).
- Assign portal ownership; routine user audit (add/remove, credential hygiene).

Validation & triangulation

- Cross-check portal trends against injury register entries and incident narratives.
- Corroborate analytics with on-floor observation and workshop feedback.

Limitations

- Early data affected by shared logins and intermittent portal access.
- Downtime not always directly attributable; used reason codes and notes as proxies.
- Observational design; no randomisation—mitigated via triangulation and before/after comparisons.

6.0 Results

1) Safety outcomes

- Over the review window**, no lacerations occurred while operating Guardian saws**.
- The few recorded hand injuries relate to **legacy bandsaw equipment** (e.g., a 2024 incident pre-Guardian on that station).
- Supervisors and operators consistently judged Guardian to be safer than alternative blade-stop systems, noting better prevention and post-event visibility (video).

2) Activation intensity and patterns

- **Overall activation intensity**: approximately **~2 activations per runtime hour** across the fleet.
- **By room:** Cutting Room carried the highest load (~2–2.5 activations/hr across machines), Boning Room higher again on some shifts (~3–4), Offal Room generally <1/hr.
- **Top reason codes: "Vision not safe"** was the dominant trigger, followed by **contact sensing** and **brake** events.
- **Operator behaviour signal**: Periodic rises in "harness disconnected" aligned with small crews assisting between stations.

3) False-positive contributors and mitigations

- **PPE reflectivity**: Blue-tinted gloves/aprons on wet product increased vision-based stops. Actions: standardise white aprons and trial non-blue gloves.
- **Moisture & fogging**: Long airline runs and refrigeration caused intermittent lens fogging. Actions: compressor/airline maintenance and simple lens-cleaning routines reduced frequency.
- **Data quality:** Shared logins limited operator-level analysis; moving to unique credentials markedly improved attribution and coaching.

4) Productivity and usability

- **Tethering trade-off:** Slight reduction in multitasking offset by higher focus and fewer risky behaviours.
- **Throughput:** With nuisance triggers addressed (PPE, moisture), activation levels stabilised within an acceptable operating range for routine production.

5) Maintenance, availability, and cost

- **Blade & alignment:** Initial alignment issues were corrected; blade changes settled to predictable intervals (≈ daily on high-load stations).
- **Servicing model:** On-site vendor servicing was technically effective but cost-prohibitive due to travel; the site adopted a self-service model with a critical-spares kit, reducing downtime and cost variance.

6) Portal access, analytics, and governance

- **Access & ownership:** Restored supervisor access and assigned clear portal ownership. Departed users removed; unique logins enforced.
- **Reporting cadence:** A quarterly KPI pack (activations/hour by machine & operator; top reasons; coaching flags) is in place for ongoing oversight and targeted coaching.

7) Ergonomics and procurement feedback

- **Lead routing**: Left-side lead can snag with swinging carcasses; preference recorded for right-side or overhead routing on future units.
- **Harness & leads**: Leads stretch with use; guidance introduced on lead length checks, correct disconnect technique, and a replacement interval policy.
- **Specification changes**: Learnings (PPE colour policy, lead routing) incorporated into future machine orders.

Overall result: Guardian bandsaws delivered a material improvement in safety (zero Guardian-related lacerations) while maintaining throughput. Activation patterns are well understood, the principal nuisance drivers are mitigated, and governance/reporting now support sustained performance and targeted coaching.

7.0 Discussion

Safety significance and causation.

The absence of lacerations while operating Guardian saws over a multi-year window is a meaningful shift from historic injury patterns on legacy equipment. While the design is observational (no randomisation), triangulation across portal activations, injury records and supervisor accounts strongly supports Guardian as the causal driver of risk reduction. Prevention (pre-contact intervention) and post-event visibility (video) together explain the improvement.

Activation patterns and what they imply.

An average intensity of ~2 activations per runtime hour is consistent with a preventive system operating in normal production. The distribution—dominated by “Vision not safe,” followed by contact sensing and brake—indicates that most events are caught by conservative vision boundaries. This is desirable from a safety standpoint, provided nuisance contributors are controlled.

False-positive drivers and controls.

Two controllable factors materially affected vision activations: (1) reflective/blue PPE on wet product, and (2) moisture/condensation causing lens fogging. Standardising to light-coloured aprons and trialling non-blue gloves reduced reflections; compressor/airline maintenance and simple lens-cleaning routines reduced fogging. A temporary rise in “harness disconnected” coincided with small crews assisting between stations—addressed via coaching and enforcing unique logins for attribution and feedback.

Throughput and usability.

Tethering slightly reduces multitasking but improves operator focus and reduces risky behaviours. Once nuisance triggers were mitigated, activation rates stabilised within an acceptable operating range and did not present a sustained throughput constraint.

Maintenance and cost control.

Early alignment issues were solved with procedure changes; blade changes settled to predictable intervals. Vendor servicing proved technically effective but economically inefficient due to travel costs. A self-service model with a small critical-spares kit achieved faster recovery, lower variance in downtime, and better cost control without compromising safety.

Ergonomics and procurement feedback.

Lead routing on the left side can snag with swinging carcasses. Operators prefer right-side or overhead routing; these preferences should be embedded in future purchase orders and assessed for retrofit feasibility where practical. Lead length checks and correct harness disconnect technique reduce wear and incidental damage.

Data governance and analytic fidelity.

Shared logins initially limited operator-level analysis and fair comparisons. Enforcing unique credentials, assigning portal ownership, and issuing a quarterly KPI pack (activations/hour by machine and operator; top reasons; coaching flags) materially improve data fidelity and enable targeted coaching, trend detection and early intervention.

Limitations and residual risk.

Findings rely on routine operations rather than controlled trials; downtime attribution is sometimes indirect (reason codes/notes). Despite these limits, consistency across evidence sources and persistence of effects over time increase confidence. Residual risk remains on legacy equipment and during atypical operating states; continued coaching and periodic audits are warranted.

Implications for adoption.

The combined technical, procedural and governance measures constitute a practical playbook: specify PPE colour policy, maintain moisture controls, enforce identity hygiene, prefer right-side/overhead lead routing, and sustain a light-touch quarterly reporting cadence. This blueprint is transferable to similar plants with minimal disruption to production.

8.0 Conclusions

- **Material safety improvement:** Over the multi-year window, no lacerations occurred while operating Guardian saws; residual hand injuries were linked to legacy equipment.
- **Preventive control works as intended:** Average ~2 activations/hour reflects a conservative, pre-contact safety envelope that stops risk early without sustained throughput penalties once nuisance drivers are managed.
- **Root causes understood and addressed:** Vision-driven stops were amplified by reflective blue PPE and moisture/fogging; standardising light-coloured aprons, trialling non-blue gloves, and improving compressor/airline maintenance reduced false positives.
- **Usability trade-off is acceptable:** Tethering slightly limits multitasking but increases operator focus and is preferred on safety grounds.
- **Data fidelity now supports coaching:** Unique operator logins, supervisor portal access and a quarterly KPI pack enable fair comparisons, early trend detection and targeted coaching.
- **Maintenance model is sustainable:** A self-service approach with a small critical-spares kit reduces downtime and avoids high vendor travel costs while maintaining performance.
- **Ergonomic learnings inform procurement:** Right-side/overhead lead routing, lead-length checks and harness-care practices should be embedded in future orders and SOPs.
- **Governance is repeatable:** The reporting cadence and portal ownership create a light, durable framework for ongoing oversight.
- **Transferable blueprint:** The combined technical, procedural and governance measures provide a practical, low-disruption adoption playbook for similar red-meat processing sites.

Overall: Guardian bandsaws deliver a sustained, evidence-backed reduction in laceration risk with manageable operational adjustments, establishing a robust platform for continuous improvement and broader rollout.

9.0 Recommendations

Safety & operations

- Retain Guardian as the site standard for bandsaw operations.
- Prioritise Guardian rollout to remaining legacy stations where practicable.

PPE & environment

- Mandate light-coloured aprons (white) and trial non-blue gloves; formalise in PPE policy/SOPs.
- Maintain compressor/airline moisture control and lens-cleaning routines to minimise fogging/condensation.

Data & governance

- Enforce unique operator logins; remove departed users; conduct a monthly user audit.
- Assign clear portal ownership (name/role) responsible for access, hygiene and reporting.
- Issue a quarterly KPI pack: activations/hour by machine & operator, reason-code distribution, coaching flags.

Coaching & supervision

- Use KPI outliers and video clips for targeted coaching (e.g., spikes in “vision not safe” or “harness disconnected”).
- Reinforce correct harness disconnect technique at toolbox talks.

Maintenance & spares

- Sustain the self-service model with a critical-spares kit (leads, harness components, key sensors); review min/max monthly.
- Keep alignment and blade-change procedures documented and refreshed in SOPs.

Procurement & ergonomics

- Specify right-side or overhead lead routing on all new POs; assess retrofit feasibility during scheduled downtime.
- Include guidance on lead length checks and replacement intervals in purchase specs and commissioning checklists.

Monitoring & continuous improvement

- Review trends at quarterly supervisor meetings; log actions/owners/dates.
- If nuisance activations rise, run a PPE/moisture quick check first, then escalate to engineering review.

10.0 Project outputs

1) Information to aid increased adoption (adoption issues, safety improvements, production impacts)

- **Industry Adoption Pack** (plain-English brief + FAQ + snapshot) summarising:
    - Safety outcome: *zero Guardian-related lacerations over the review window*.
    - Typical operating range: *~two activations per runtime hour*, with nuisance triggers controlled via **PPE colour**, **moisture/fogging** management, and **identity hygiene** (unique logins).
    - Production/uptime implications: tethering trade-off acceptable; **self-service + critical spares** minimises downtime and external travel costs.
- **Governance toolkit**: quarterly KPI template (activations/hr by machine & operator; reason codes; coaching flags), portal ownership checklist, and user-access SOP.
- **Operational inserts for SOPs**: PPE colour policy (light aprons; trial non-blue gloves), lens-clean/airline moisture routines, lead-length checks, harness-care guidance.
- **Adoption playbook**: step-by-step rollout guidance covering commissioning, data hygiene, coaching, and review cadence.

2) Recommendations to Guardian (product and technology improvements to further improve safety and adoption)

- **Ergonomics & hardware**: prefer **right-side/overhead lead routing**; improved strain relief and wear indicators on leads/harness; quick-clean lens shroud.
- **Vision robustness**: options for **anti-fog/air-purge** at the lens; guidance on minimum air quality/drying; maintainable camera alignment references.
- **Analytics & portal**: faster operator switch/unique-ID enforcement, operator-level KPI views, clearer reason-code taxonomy, and more reliable multi-user access/permissions.
- **Serviceability**: modular **critical-spares kit**, alignment jig/check routine, on-device status cues, and optional remote diagnostics.
  (Delivered as a concise, prioritised recommendations memo for Guardian; detailed justifications retained in the confidential report.)

3) Cross-species evaluation (three species, potential use cases)

- **Beef**: Offal, Cutting and Boning rooms—routine carcass and portioning tasks; validated with current deployment and analytics.
- **Lamb/small-stock**: Cutting/boning operations with wet-surface reflectivity controls (PPE colour) and lens moisture management.
- **Goat**: Relevant cutting/boning use cases identified; adoption contingent on standard PPE and moisture controls (no design specifics disclosed here).
- **Species applicability note**: prerequisites, constraints and commissioning checklist for each species; public version provides high-level use cases, confidential version includes site-specific considerations and indicative KPI ranges.

11.0 Bibliography

not applicable