

Quality Evaluation and Post-Editing of Machine Translation: A Case Study of the Auto-parts Industry

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Abstract: Driven by global integration, the auto-parts industry is integrating into international markets at an unprecedented pace. Cross-border technical exchanges, localization of product manuals, and close communication across supply-chain links impose higher requirements for language-translation services. As a lingua franca for international business communication, English plays a central role in auto-parts translation. Despite the potential of machine translation (MT) to process massive volumes of technical documents amid technological advances, unstable translation quality remains a major bottleneck, bringing hidden risks for direct deployment. How to accurately evaluate the quality of machine-translated texts in the auto-parts sector, optimize post-editing workflows based on evaluation results, and improve overall operational efficiency has become an urgent industrial challenge ^[1]. This paper explores strategies for quality evaluation and post-editing efficiency improvement for machine translation within the auto-parts industry. By analyzing the root causes behind prevailing industrial challenges, it proposes practical solutions for practitioners. It aims to guarantee translation quality while substantially boosting work efficiency and supporting auto-parts enterprises in steady progress amid global competition ^[2].

Keywords: Machine translation; Quality evaluation; Post-editing; Auto-parts industry; Technical translation

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1. Types and characteristics of auto-parts texts

1.1. Types of auto-parts texts

The auto-parts industry is a globally-oriented sector characterized by intensive technology and stringent standards. From Germany's Bosch and Japan's Denso, every link in its industrial chain — collaborative R&D, manufacturing, marketing and after-sales services — relies heavily on accurate technical-document communication. Covering product specifications, engineering drawing annotations, manufacturing process descriptions, quality-control criteria, maintenance guidelines, bill of materials (BOM), and safety-compliance documents, these diverse files constitute the cornerstone of industrial operations.

1.2. Characteristics of auto-parts texts

Focusing on technical instructions, standards and specifications, and product parameters, auto-parts texts differ greatly from literary and general business documents. They feature high specialization, rigorous logic, clear structures, and frequent standardized symbol usage. Their core traits fall into five categories.

First, professional terminology is densely deployed with unique and mandatory translations. Auto-parts documents contain abundant terms for components, system names, materials, manufacturing processes, testing methods and standard codes. These terms have fixed equivalents and must not be arbitrarily replaced or freely paraphrased. Terminology errors may trigger component misconceptions, assembly faults, and system misinterpretation. Highly-specialized acronyms such as ABS and OBD frequently appear. Consistent renderings for identical concepts must be maintained throughout documents to avoid confusion and distorted information delivery.

Second, sentence structures are complex, featuring lengthy sentences with sophisticated logical hierarchies. In technical manuals, standards and drawing instructions, English source texts commonly adopt passive voice and nominalization, coupled with multi-layered attributives, conditional clauses and adverbials of purpose. This generates long sentences with complicated modifiers and deeply-nested logic covering diverse premises and conditions. By contrast, Chinese technical writing favors conciseness, clear subject-predicate structures and precise procedural instructions. Such linguistic differences often lead to disordered word order and fragmented logic in machine-translated outputs.

Third, figures, parameters, units and symbols appear frequently and demand absolute accuracy. Auto-parts documents are typical data-intensive texts filled with quantitative information such as dimensions, tolerances, torque values and temperatures, alongside material grades, model specifications and other codes. Unit symbols, including mm and N·m, follow strict regulatory standards. In the auto-parts sector, minor mistakes in figures, symbols or units are far from trivial. They may cause quality failures, safety hazards or even product-certification rejection.

Fourth, formatting is highly standardized; layout and styling carry engineering significance. Manuals, drawings, BOM sheets and inspection documents impose strict formatting rules for numbering, hierarchical structures and bullet points. Tables, figure numbers, annotations and citation positions cannot be altered arbitrarily. Translators and editors must strictly follow source-document formatting without random adjustments to line breaks, paragraph divisions or punctuation marks.

Fifth, diverse text types require differentiated quality levels. Within one enterprise, translation tasks are stratified by quality requirements. Internal reference materials such as emails, brief reports and ad-hoc files only need readability free of critical errors. Process-oriented documents including work instructions and inspection specifications demand error-free terminology and parameters. Externally-delivered documents such as product and user manuals must achieve zero terminology or parameter mistakes, coherent logic and compliance with destination-market regulations. National and industrial standards require authoritative, rigid wording permitting no deviation.

2. Application status and challenges of machine translation in the auto-parts industry

Boasting massive technical documentation and detailed component descriptions alongside multinational trade links, the auto-parts industry serves as an ideal research scenario for machine-translation applications.

Nevertheless, complicated terminology systems and strict safety requirements create constraints for MT deployment. Currently, auto-parts enterprises mainly apply machine translation to three scenarios: technical-document translation, supply-chain collaborative communication and cross-border e-commerce operations^[3].

Auto-parts machine translation faces intertwined challenges. Terminology consistency tops the list, as identical components bear varied denominations across different brands and easily trigger confusion. Data security and compliance deserve special attention particularly for patent-related content. Format processing represents another bottleneck for non-text resources such as drawings and tables. Enterprises also need to balance cost-effectiveness when choosing between high-end customized solutions and generic MT systems.

2.1. Application status

2.1.1. Technical-document translation

For multilingual translation of product manuals, maintenance guides and specification sheets, conventional human translation incurs high costs and long turnaround cycles. Machine translation enables rapid processing of bulk documents, and term banks further improve terminology consistency. For instance, enterprises including Bosch and Denso deploy customized MT systems to accelerate document localization.

2.1.2. Cross-border e-commerce

When auto-parts sellers operate on platforms such as Amazon and Alibaba, product names, parameters and descriptions need accurate translation for target markets. Integrating machine translation into e-commerce back-ends enables real-time translation.

2.1.3. Supply-chain communication

Frequent cross-linguistic exchanges for purchase orders, contracts and technical inquiries occur in global sourcing workflows. General-purpose MT tools such as Google Translate and DeepL support instant communication and mitigate misunderstanding risks.

2.2. Major challenges

2.2.1. Accuracy of professional terminology

The auto-parts domain maintains an intricate terminology system; single components may carry multiple colloquial aliases and create translation obstacles. Lacking domain adaptation, general-purpose machine translation is prone to ambiguity, which necessitates industry-specific term banks and domain-oriented model fine-tuning for improved accuracy. Take the thermostat, a critical engine valve controlling coolant circulation to prevent overheating. Its standard technical name in documents, drawings and standards corresponds to the Chinese term “节温器”. In-house practitioners, including maintenance technicians, warehouse staff, and after-sales personnel, use short forms such as “温器” or “调温阀”. Other colloquial aliases include “水温开关”, “温控阀” and “热控阀”. Machine-translation outputs often produce inappropriate equivalents such as “thermostat” (used for household air-conditioners or water heaters) and “automatic temperature regulator”, overly-generic expressions unsuitable for auto-parts contexts.

2.2.2. Contextual and multi-modal comprehension

Accurate auto-parts translation relies on comprehensive contextual information from drawings and

part-number codes. For the broad category of screws and bolts, thousands of variants differ subtly in structure and function. Without references such as physical samples or drawings, machine translation can only generate superficial literal translations. For example, “Flange screw” alone provides insufficient precision for auto-parts scenarios. Components with integrated washers may be referred to as “Shoulder screw” or “Collar screw” in Europe and North America. For exhaust-pipe connections, the term “Exhaust flange bolt” is more accurate. Providing German purchasers merely with the rendering “Flange screw” may cause misinterpretation. The German term *Flanschschraube* denote a mechanically-distinct component, leading to wrong sample orders and subsequent troubles for production and sales.

2.2.3. Data security and compliance

Sensitive-data security is critical for auto-parts enterprises. Risks of data leakage emerge when firms process confidential design documents and patent materials via public-cloud machine-translation services. During product R&D, patent application and supporting-component development, auto-parts enterprises generate large volumes of sensitive documents covering component-structure drawing descriptions, new assembly-process files, patent claims, critical dimension-and-tolerance records and new-material technical proposals. Leaks of such materials may result in technology disclosure, preemptive patent filings, competitor imitation and loss of supplier qualification. One enterprise once submitted a full patent specification for a new camshaft phase-adjustment mechanism to a public-cloud MT tool. The uploaded content included structural principles, key fitting dimensions, control strategies and innovation descriptions. Although not explicitly classified as top-secret, such data reveals core R&D orientations and technical routes. Third-party providers may store, trace and analyze these materials, potentially triggering patent disputes and technology erosion and weakening corporate competitiveness^[4]. Core-technology-related auto-parts documents should avoid public-cloud machine-translation services.

3. Quality evaluation of machine-translated auto-parts texts

In quality evaluation for machine-translated auto-parts texts, priority should be assigned to the accuracy and consistency of professional terminology. Given high term density and strict standards for auto-parts documents, fixed translations must be adopted for each component throughout the full text to avoid mixed aliases. For “节温器”, translations must not alternate between “thermostat” and “temperature-regulating valve”. A “crankshaft sensor” must never be mistranslated as “crank sensor” or “rotary-shaft sensor”. Terminology errors or inconsistency trigger component-recognition confusion, assembly misunderstanding and poor after-sales communication — among the most prevalent defects impairing MT usability. Evaluators shall first verify whether core terminology complies with industrial standards and remains consistent across the whole document.

Second, evaluators must rigorously check the correctness of figures, parameters and symbols. Auto-parts documents contain abundant dimensions, tolerances, torque values, pressure indicators, model codes, drawing numbers, standard codes and unit symbols that permit zero errors. Machine translation may alter numerals, omit units, or corrupt symbol formatting. For example, “ ± 0.02 mm” may be simplified to “0.02 mm”, the unit N·m may disappear, and part numbers may be fragmented. Seemingly minor defects can cause machining deviations, assembly failure, inspection non-compliance and safety hazards. Parameter-related errors count as critical defects requiring mandatory revision before translated texts can be adopted.

Third, evaluators need to assess logical coherence and semantic accuracy. Auto-parts technical documents consist largely of long sentences, conditional clauses, operational procedures and principle explanations requiring rigorous logical clarity. Machine translation often rigidly replicates English syntactic structures and produces verbose, awkward translations with disordered word order, ambiguous logic or reversed meanings. For instance, “monitoring signal” may be mistranslated as “control signal”, and “note for installation” may become “note for disassembly”^[5]. Evaluators shall read through each sentence, judge whether outputs conform to Chinese technical-writing conventions, and eliminate ambiguous or misleading statements to guarantee comprehension by engineers, production staff and maintenance workers.

Fourth, evaluators shall examine formatting standardization and content completeness. Auto-parts documents feature fixed formatting for lists, numbering, paragraph hierarchies, punctuation, bold text, figure-number citations and tables. Machine translation may disrupt line breaks, modify numbering, misuse punctuation or erase special symbols and render outputs unfit for formal deployment. Evaluators compare target texts against source documents to verify formatting consistency and full content retention^[6]. Special attention must be paid to ensuring safety warnings, notes and mandatory requirements are neither omitted nor weakened.

Quality evaluation for auto-parts machine translation shall adhere to fundamental principles: practical usability, technical precision and regulatory compliance. Only translations satisfying all four criteria — consistent terminology, correct parameters, coherent logic and standardized formatting — can enter post-editing workflows. Mere fluency and literal correspondence cannot satisfy strict auto-parts requirements for precision, safety and standardization^[7].

4. Strategies for improving post-editing efficiency in auto-parts translation

Improved post-editing efficiency relies on three dimensions: corpus infrastructure construction, multi-tool collaboration and translator competence development.

4.1. Infrastructure construction: Term banks and translation memories

First, enterprises shall build proprietary term banks. Terms covering core components, systems, standards, acronyms, materials, manufacturing processes, testing procedures and safety warnings should be collected and managed under the framework: System — English Term — Chinese Term — Remarks. Take OBD as an example: its standard Chinese equivalent is On-Board Diagnostics, with remarks prohibiting non-standard alternatives such as “on-board detection”.

Second, enterprises shall establish translation memory (TM) databases to archive validated historical translations. For new assignments, fuzzy matching retrieves existing segments, and repeated fragments can be reused directly to reduce machine-translation and manual-editing workloads. This approach delivers prominent gains for highly-repetitive documents such as manuals, part lists and standards. For example, one older sentence reads “Applicable to naturally aspirated gasoline engines”, while a revised version states “Applicable to turbo-charged gasoline engines”. When the translation memory detects a high similarity of 90 %, it retrieves the validated translation and highlights divergent segments. Editors only revise “naturally aspirated” to “turbo-charged” instead of re-translating the whole sentence, thus saving substantial time and labor and enhancing productivity^[8].

4.2. Multi-tool coordination

Priority should be given to CAT platforms such as Trados and MemoQ supporting real-time term prompting, translation-memory matching, error highlighting, batch replacement and version management. MT outputs can be imported directly into CAT environments. Inconsistent terminology triggers automatic alerts; standard-term suggestions reduce dictionary-lookup overhead during editing ^[9]. Revised segments are automatically saved into translation memories for iterative corpus optimization. Built-in quality-check tools automatically inspect terminology consistency, numeric formatting and punctuation standards ^[8].

4.3. Enhancing translators' professional competence

Linguistic proficiency alone is insufficient for accurate auto-parts translation. Translators need solid domain knowledge and in-depth understanding of technical essentials. In auto-parts translation, inconsistent and non-standard terminology represents a frequent source of mistakes. Translators should study national standards, industrial specifications and corporate naming conventions. They must not invent arbitrary translations or adopt colloquial aliases in formal documents. Uniform terminology for each component must be maintained across full documents to avoid internal contradictions and conceptual confusion ^[6].

5. Conclusion

For the auto-parts industry, effective deployment of machine translation is far more than simple text input-and-output. It constitutes a systematic initiative covering technology, workflows and human resources. Looking ahead, advances in artificial intelligence will steadily improve the baseline quality of raw machine-translation outputs. Post-editors will gradually shift their core responsibilities from correcting basic errors to polishing expressions and unifying stylistic norms. Even so, human review remains irreplaceable for safety-related, compliance-oriented and technically-detailed content. Machines cannot fully interpret the implicit meaning of technical drawings or local market regulatory requirements ^[3].

Rejecting machine translation is not a rational choice for auto-parts enterprises. The key lies in integrating MT steadily into operational workflows and leveraging it as a powerful assistant for global-market expansion ^[10]. Such practices accelerate worldwide roll-out of products and technologies while guaranteeing accurate information transfer and enabling enterprises to advance steadily on the international stage.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Cheng S, Yu S, 2025, Post-Editing Teaching and Post-Editing Competence Cultivation: Practices, Findings and Enlightenments. *Contemporary Foreign Languages Research*, (04): 182–195.
- [2] Zheng YX, Liu YM, 2025, A Review of Researches on Machine Translation Quality. *English Square*, (23): 40–43.
- [3] Cheng XY, 2026, Application of Computer-Aided Translation Tools in Automotive Text Translation: An Internship Report at Language Bridge Translation Company, thesis, Sichuan International Studies University.
- [4] Liu S, 2025, From Rule-Based to Generation-Driven: Evolution, Current Situation and Future Trends of Machine

- Translation Technology. Shandong Foreign Language Teaching Journal, 46(03): 122–132.
- [5] Kuang KF, 2018, A Brief Analysis of Passive Voice Errors in Machine Translation from English to Chinese. Data of Culture and Education, (16): 38–39 + 25.
- [6] Li XQ, Zhang YQ, 2025, Discussion on Post-Editing Problems of Machine Translation. Ancient and Modern Creation, (23): 93–95.
- [7] Wu M, 2024, Strategies for Improving English Translation Quality of New-Energy Automobile Industry from the Perspective of International Business. Guangdong Economy, (10): 55–57.
- [8] Li XD, 2022, Strategies for Improving English Translation Efficiency Based on Translation Tools. Overseas English, (11): 24–25.
- [9] Cui QL, 2014, On Post-Editing of Machine Translation. Chinese Translators Journal, 35(6): 68–73.
- [10] Jin T, Yang Y, 2025, Post-Editing Strategies for Energy Science and Technology Texts in the Digital-Intelligent Era. English Square, (32): 23–27.

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