

# Analysis Of Undergraduate Graduation Design Writing in Mechanical Engineering

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**Abstract.** This article systematically reviews the entire process of my undergraduate graduation design in mechanical engineering, covering topic selection, literature review, design research, thesis writing, and summary reflection. It elaborates on the key experiences and gains in each stage. The article first emphasizes the importance of balancing interest, ability, and resources during the topic selection stage. It then introduces an efficient four-step method for literature review and a framework for writing a review. In the design research section, it showcases the complete chain of "theory - calculation - verification - optimization" around four core steps: theoretical calculation, 3D modeling, finite element simulation, and experimental verification. Subsequently, it summarizes the writing norms, chart expression, logical structure, and key points for defense preparation of mechanical engineering theses. Finally, it reflects on the entire journey, pointing out that the graduation design not only integrates professional knowledge, cultivates engineering thinking and autonomous learning ability, but also completes the role transition from "student" to "engineer". The full text aims to provide a referenceable and replicable graduation design path for subsequent mechanical engineering students, helping them complete their academic capstone projects with high quality.

**Keywords:** Mechanical graduation design; topic selection strategy; literature review; finite element simulation; engineering thinking; thesis writing

## 1.Introduction

Graduation design, often referred to as the "grand finale" of a four-year university study, is not only a comprehensive assessment of the mastery of professional knowledge but also an important bridge for students to transform theory into practice and move from books to engineering projects [1]. Especially for students majoring in mechanical engineering, graduation design is not merely a thesis but more like a complete engineering work, integrating multiple aspects such as design, calculation, simulation, manufacturing, and thesis writing. It can be said that graduation design is both a summary of the learning stage and the starting point of the future career path.

Before I started my mechanical graduation design, I was filled with both anticipation and concerns. I was looking forward to finally applying the mechanical design principles, material mechanics, and other knowledge I had learned in class to a real engineering problem. At the same time, I was worried about whether I could complete a complete, reasonable, and innovative design within the limited time. This contradictory feeling accompanied me throughout the preparation and implementation of the graduation design. Compared with graduation designs in liberal arts and management, mechanical graduation design places more emphasis on "hands-on" and "implementation". It not only requires students to draw complete design drawings but also to conduct mechanical calculations, structural analysis, and even process and test prototypes if conditions permit. This comprehensive requirement forces mechanical engineering students to learn to break through the limitations of a single discipline and integrate knowledge from mathematics, physics, computer science, and engineering management [2].

Therefore, in a sense, mechanical graduation design is not only an academic exercise but also a training ground for engineering thinking and innovation. It tests not only "whether one can write a thesis" but also "whether one can do engineering". Because of this, every student who completes a

mechanical graduation design will gain growth beyond what is learned in the classroom during the process.

## 2. Topic selection experience

**2.1 The Importance of Topic Selection.** A good start is half the battle for success. "In graduation, choosing a topic is undoubtedly the most crucial beginning. For mechanical engineering students, the topic selection should not only meet the research direction of the supervisor and the requirements of the college, but also consider personal interests, abilities, and future development directions. If a topic is too complex, it may be difficult to complete within a limited time; If a topic is too simple, it can easily appear to lack innovation and value. How to find a balance between the two is my deepest experience when choosing a topic.

In the field of mechanical engineering, common graduation project topics can be roughly divided into the following categories:

- 1) Mechanical structure and transmission design: such as reducer design, mechanical arm joint design, transmission system optimization, etc.
- 2) Automation and Control Category: System design involving the combination of machinery and electronics, such as automatic feeding devices, improvement of CNC machine tools, intelligent logistics sorting equipment, etc.
- 3) New materials and manufacturing processes: such as research on the application of new composite materials in mechanical components, optimization of 3D printing processes, etc.
- 4) Robotics and intelligent equipment category: including subsystem design for mobile robots, service robots, or special operation robots.
- 5) Simulation and Optimization: Modeling, simulating, and optimizing complex mechanical systems through software.

These directions include both the continuation of traditional mechanical design and the new trend of combining with intelligent manufacturing and artificial intelligence. When we students make choices, we can safely choose "classic questions" to ensure smooth completion; You can also bravely try "emerging directions" and broaden your horizons in the process.

**2.2 Combining one's own interests and strengths.** In the topic selection stage, I first ask myself a question: "What do I really want to do?" because I understand that if a topic is completely uninteresting, then in the following months, facing a lot of calculations, repeated revisions, and potentially failed experiments, it is easy to lose motivation. Interest is the best teacher, and its importance is even more prominent in a project like graduation that requires sustained investment.

At the same time, interests must also be combined with one's own strengths and abilities. For example, if you are familiar with CAD modeling and finite element analysis during your undergraduate studies, you can lean towards structural design and simulation optimization when selecting a topic; If programming and electronic knowledge are strong, topics related to mechatronics and automation devices can be considered. Only by combining interests and abilities can the topic be more feasible.

**2.3 Consider feasibility and resource conditions.** A good topic must be able to be completed within the established time and resource range. For example, some projects require specialized laboratory equipment or expensive materials, which can seriously affect progress if conditions do not permit. Mechanical engineering graduation not only involves writing papers, but also often requires drawing blueprints, machining parts, and experimental verification. Therefore, when selecting a topic, it is necessary to fully understand the resources that the laboratory and supervisor can provide [6].

I was also attracted by some "grand" ideas at that time, such as wanting to create a complete design for a small drone. But after communicating with the mentor, it was found that the scope of unmanned aerial vehicles is too broad, not only involving aerodynamics, but also requiring flight control systems, battery management, etc., which exceeds the scope of time and capability. In the end, I chose a smaller but targeted topic, which is the optimization design of a certain type of

mechanical transmission mechanism. It has been proven that this choice allows me to focus my limited energy on in-depth research and optimization, rather than just trying everything out.

**2.4 Communication and mentor's opinions in topic selection.** The selection of graduation project topics is not a one-sided closed-door process for students, but a dynamic process that requires full communication and two-way interaction with mentors. With his profound research accumulation and academic vision, the mentor can provide key guidance on the feasibility and value judgment of topic selection, helping us to accurately tailor vague ideas into specific topics with moderate scope and clear goals like an "academic tailor", and explore real innovative points [8].

This process also requires students to play an active role and communicate with preliminary ideas and specific questions that have been sorted out through literature, rather than passively waiting for instructions. Effective communication not only avoids deviating from research direction or falling into implementation difficulties, but also deeply reflects as an initial experience of academic cooperation and scientific thinking. It makes us realize that research is not a solitary journey, but a process of engaging in dialogue with academic traditions and learning how to manage a complete project under the guidance of a mentor. Therefore, in-depth communication during the topic selection stage not only lays a solid foundation for the paper, but also serves as an indispensable core element in the comprehensive training of graduation, cultivating the critical skills of rigor, communication, and problem-solving in future academic or professional careers.

**2.5 Case sharing.** Taking myself as an example, my final thesis topic is "Optimization Design of Fiber Optic Unloading Mechanical Transmission Device Based on Finite Element Analysis". This question may seem traditional, but it involves multiple steps in practical operation: first, establish a theoretical calculation model of the transmission device, then use SolidWorks for 3D modeling, then import ANSYS for finite element analysis, and finally optimize and improve the structure of the transmission device. This series of processes has made me deeply realize that the value of mechanical engineering graduation does not necessarily lie in how innovative it is, but in whether it can solidly complete the engineering process and demonstrate comprehensive application ability.

Through this project, I not only honed my basic skills in mechanical design, but also gained a deeper understanding of software simulation analysis. At the same time, I learned how to clearly express the design process and results in academic language in my paper. These gains are far more meaningful than just academic paper grades.

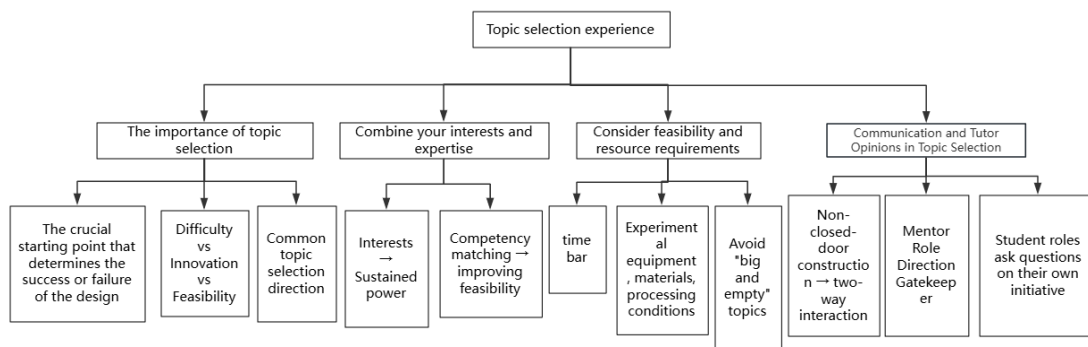


Figure 1. Structure diagram of topic selection experience

### 3. Literature research and data collection

**3.1 The Importance of Literature Research.** Before entering formal design and research, systematic and in-depth literature research is an indispensable first step for mechanical engineering students. It is not simply searching and piling up a few papers, but a systematic sorting and learning process that requires a rigorous attitude and critical thinking. By comprehensively searching and reading domestic and foreign literature, researchers can clearly grasp the research status, technological development trends, key bottlenecks, and future main trends in specific fields, thus finding innovative and feasible entry points for their graduation projects [11].

Looking back at my own experience, I also fell into the misconception of "more information is better" in the early stages of research, but soon realized that collecting literature without restrictions would only lead to information overload, and instead drown the truly valuable core content in the ocean of materials. Through practice and reflection, I have gradually developed an efficient method: first, conduct extensive topic searches and preliminary readings to establish a comprehensive understanding of the field; Then, based on criteria such as relevance, authority, and timeliness, the literature is gradually screened and classified; Finally, the content of the intensive reading literature is analyzed, compared, and synthesized to form a literature review with clear logic, prominent focus, and strong support for the research topic, laying a solid theoretical foundation for the smooth development of subsequent design and research [12].

**3.2 Search channels and methods.** In the current academic environment, systematic and efficient literature acquisition is the cornerstone of scientific research work. For researchers and students in the field of mechanical engineering, literature research mainly relies on the following authoritative channels: domestically, various databases subscribed by school libraries, such as China National Knowledge Infrastructure, Wanfang Data, and VIP journals, are indispensable sources for obtaining Chinese core journal papers, dissertations, and conference reports; At the international level, it is necessary to rely on well-known platforms such as IEEE Xplore, ScienceDirect, and SpringerLink, which provide key windows for tracking international cutting-edge technology trends and theoretical breakthroughs. In addition, comprehensive academic search engines such as Google Scholar can quickly locate the latest global research related to keywords across platforms, greatly improving search efficiency. It is particularly noteworthy that mechanical design, as a highly engineering discipline, must also pay full attention to patent databases and domestic and foreign standard literature when it comes to specific structures, processes, and innovative applications. Such literature provides standardized constraints and practical feasibility references for design schemes [13]. In practical operation, I usually start with core terms such as "mechanical transmission optimization", "finite element structural analysis", "gear reducer design", etc., and gradually expand the search scope through semantic association. Every time a literature is carefully read, the author, publication year, core methods, main conclusions, and relevance to the topic are systematically recorded. This rigorous information management habit effectively avoids the accumulation of literature and confusion in later stages, laying a solid foundation for the formation of high-quality literature reviews [14].

**3.3 Reflections on Writing Literature Reviews.** In the construction of academic papers, literature review is far from a "formal necessity". Its core value lies in systematically sorting out and critically evaluating existing research, thereby clearly establishing the foothold and innovation of one's own research. It is a key part of demonstrating the theoretical basis and research necessity of the topic. For disciplines with strong applicability and rapid development such as mechanical engineering, a well-structured literature review usually covers multiple dimensions: firstly, it is necessary to clearly explain the research status, summarize the main achievements and technological progress made by domestic and foreign scholars in the relevant field; Furthermore, it is necessary to objectively analyze the existing problems, that is, to point out the technical bottlenecks, theoretical deficiencies, or application limitations that have not yet been overcome in the current research results; On this basis, it is necessary to further summarize the research trends in this field and grasp the future direction of technological development; Finally, by discarding existing research and accurately identifying research gaps, the innovative points of this topic are naturally introduced, and how the research work will fill a specific gap is clarified. In practical writing, I try my best to avoid falling into the trap of "literature piling up", and instead focus on using internal logical clues to organically connect different literature.

Literature research allowed me to truly understand the meaning of the phrase 'standing on the shoulders of giants' for the first time. Through extensive research, I not only learned how to extract information, but also gradually developed academic sensitivity. For example, when I find that most of the literature in a certain field is focused on ten years ago and has been less updated in recent

years, I will think: is this because the technology has already matured, or is it because it has encountered bottlenecks? This kind of thinking ability is rarely exercised in classroom learning.

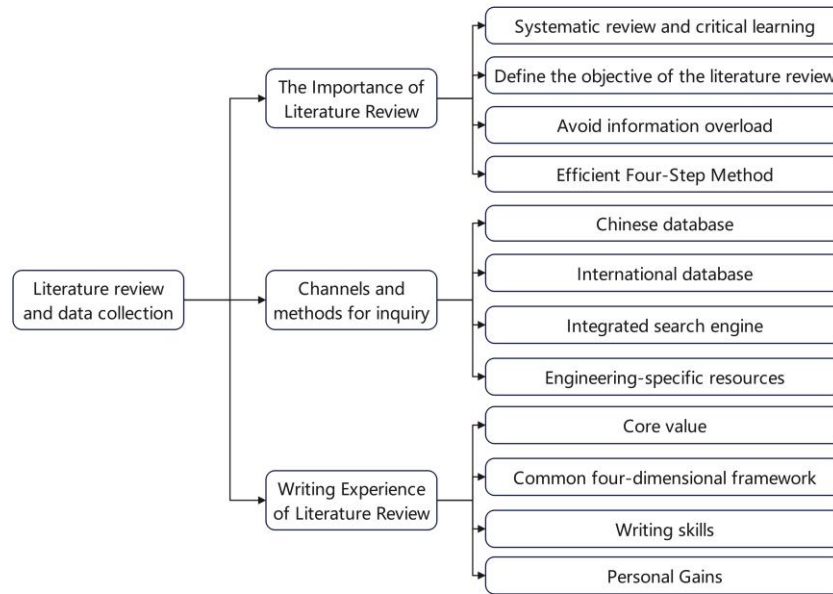


Figure 2. Structure diagram of literature research and data collection

#### 4 Design and research process

The core of mechanical graduation lies in "doing design" and "doing research". This stage is both the most challenging and rewarding part. From the initial theoretical analysis, to software modeling and simulation, to possible experimental verification, each step has given me a deeper understanding of the work of a 'mechanical engineer'.

**4.1 Theoretical calculation: the cornerstone of design.** The implementation of any mechanical design must be based on rigorous theoretical calculations. Taking the optimization design of the transmission device I conducted as an example, the entire process first requires systematic calculation of the key parameters of the gears. These parameters mainly include modulus, number of teeth, tooth width, transmission ratio, and center distance. They not only determine the geometric characteristics of gears, but also directly affect transmission efficiency, load-bearing capacity, and service life. For example, modulus is a basic parameter for measuring the size of gear teeth, which determines whether gears can achieve standardized machining and assembly; The number of teeth and transmission ratio affect the conversion relationship between speed and torque; The reasonable selection of tooth width and center distance directly affects the load-bearing capacity and operational stability of the gear.

When studying and applying these parameter calculations, I reviewed the relevant content in "Mechanical Design" and "Mechanical Principles" again. At first, the complex derivation of formulas and step-by-step calculations made me feel a bit bored and difficult. But when I transformed specific design requirements into actual data and sequentially inputted them into calculation formulas, gradually obtaining a set of combinatorial design parameters, I personally experienced the close integration of theory and practice. The feeling of 'getting something on paper but feeling shallow' quickly dissipated in this process, replaced by a clear understanding and sense of achievement.

More importantly, this process has made me deeply realize that theoretical calculations are not the ultimate goal, but a prerequisite for subsequent simulation and optimization. Any mechanical design without a solid theoretical basis may have hidden dangers in terms of structural strength, motion accuracy, or energy efficiency. Only by ensuring that the design is 'solid' on a theoretical

level, can subsequent 3D modeling, finite element analysis, and even prototype testing proceed smoothly. This complete chain consisting of "theory calculation verification optimization" is the embodiment of the scientific nature of modern mechanical design.

**4.2 3D modeling and assembly: making design "concrete".** After completing the theoretical calculations, I entered the 3D modeling phase using SolidWorks software. 3D modeling is not only a reproduction of paper design, but also a process of theoretical verification. By inputting parameterized dimensions into the model, I can visually verify whether the calculated modulus, tooth width, center distance, etc. can maintain rationality in actual assembly. In other words, modeling is a crucial step in the transition from theoretical design to engineering practice.

In the specific modeling process, I encountered many detailed issues. For example, the connection between gears and shafts is not just about drawing a contact surface, but requires selecting an appropriate connection form. Common key connections may seem simple, but the size, depth, and interference fit of the keyway must comply with national or international standards, otherwise it may result in insufficient strength or assembly difficulties. Similarly, interference detection often occurs during component assembly - interference detected in virtual environments means that it cannot be completed in actual machining and assembly, which requires designers to optimize the component structure in advance.

To solve these problems, I consulted a large number of standard parts manuals and learned the true meaning of standardized design. Standards are not only constraints for engineers, but also the foundation for ensuring the universality, interchangeability, and processing efficiency of parts. By applying standard components, the design is not only safer and more reliable, but also easier to manufacture and maintain.

When the three-dimensional model of the transmission device was successfully assembled on the screen, I strongly felt for the first time that "design came to life". This intuitive visualization effect has given me a deeper understanding of the spatial relationships of mechanical structures, and has also laid a solid foundation for subsequent motion simulation and strength analysis.

**4.3. Finite element analysis and simulation optimization.** Finite element analysis is one of the most commonly used and professional aspects in mechanical engineering. I conducted stress analysis and modal analysis on the transmission device by importing the 3D model into ANSYS.

In the initial simulation, I made some low-level mistakes, such as the mesh division being too coarse, resulting in unstable results, or the boundary conditions being set improperly, causing stress concentration distortion. By constantly trying and consulting with my mentor, I gradually mastered the key points of simulation. Firstly, grid division should balance accuracy and efficiency, and key areas should be appropriately encrypted. Secondly, the boundary conditions must conform to the actual working conditions and cannot be taken for granted. Finally, the analysis results need to be validated through theoretical calculations, and cannot rely solely on the numerical output of the software.

In the optimization phase, I attempted to improve the performance of the transmission device by changing the gear material and reducing the structural weight. The final result showed that while ensuring strength, the weight of the device was reduced by about 8%. Although this is not a disruptive innovation, it deeply impressed me with the engineering value of "optimization".

**4.4 Experiment and Verification.** Some mechanical engineering projects will involve experimental verification, such as machining parts, building experimental benches, etc. The laboratory conditions I am in are limited, so only partial validation experiments can be conducted. I chose to conduct simplified tests on key parts of the transmission device and measure the transmission efficiency by loading a test bench.

During the experiment, data collection was not as smooth as expected: sometimes due to insufficient sensor sensitivity, the data fluctuated greatly; Sometimes the test bench itself experiences wear and tear, leading to significant experimental errors. These issues have made me realize that real engineering experiments are often more complex and difficult to control than software simulations. But it is precisely this uncertainty that has given me a clearer understanding of the "pragmatic" and "rigorous attitude" that engineers must possess.

**4.5 Problems and Solutions.** Throughout the entire design and research process, I also encountered many difficulties: on the one hand, I had to balance graduation, postgraduate entrance examination, and job hunting at the same time, and often felt time was tight; On the other hand, some of the content related to materials science and electrical control is beyond my professional scope and requires additional learning; In addition, when experiments fail or simulation results are not ideal, I often have doubts and psychological pressure about whether they can be completed smoothly. To address these issues, I have gradually summarized some methods: firstly, develop phased plans, break down ambitious goals into executable small tasks, and gradually complete them; Secondly, broaden learning channels through Bilibili MOOC、Zhihu and other platforms quickly supplement unfamiliar knowledge; Finally, actively communicate with mentors and classmates when encountering bottlenecks, rather than struggling alone. It is these methods that have helped me overcome the most difficult stages and enabled me to achieve self-growth in the process of problem-solving.

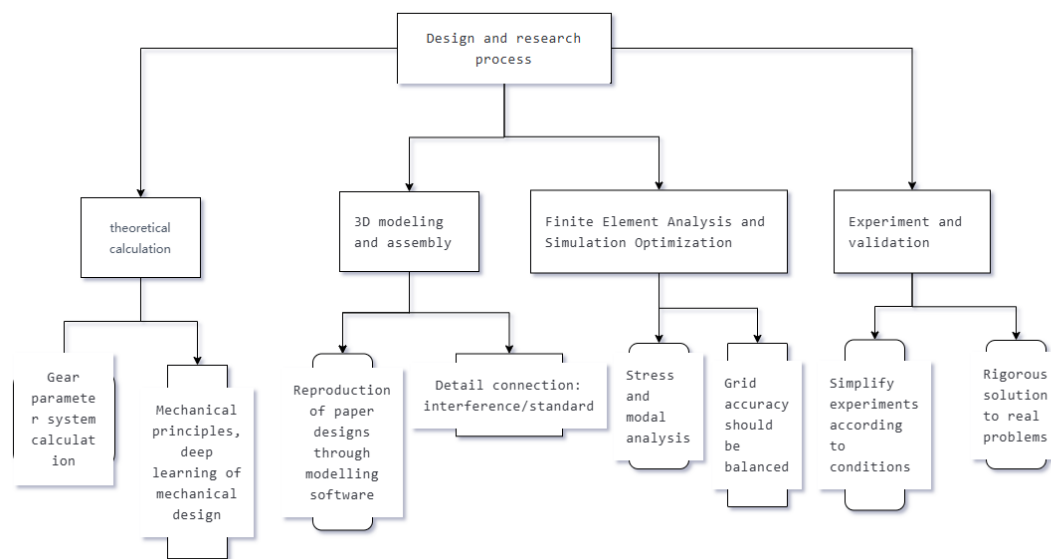


Figure 4. Structural diagram of design and research process

## 5.Thesis Writing and Expression

The 'work' of mechanical graduation design is not limited to models, drawings, or experiments, but more importantly, presented in the form of a thesis. A thesis is not only a summary and condensation of the entire research process, but also the main basis for the supervisor and defense committee to understand your work results. How to express complex research processes clearly, accurately, and logically is another challenge that mechanical students must overcome.

**5.1The Importance of Writing Standards.** There is a significant difference between mechanical papers and humanities papers, as they emphasize more on data support and logic. For example, in the introduction section, it is necessary to provide a concise and clear explanation of the research background and significance; In the design and experimental section, there should be clear calculation basis, experimental conditions, and results; In the conclusion section, the innovative points and practical value should be highlighted. Any vague or lack of data description will appear insufficiently rigorous.

I strictly follow the school's paper standards when writing, including font, paragraph, chart numbering, reference format, etc. At first, I thought these "format requirements" were cumbersome, but later I gradually realized that these details are a reflection of academic rigor. Especially the standardized citation of references can make the paper more authoritative and avoid the risk of academic misconduct.

**5.2 Expression of drawings and charts.** In mechanical papers, the quality of drawings and charts often determines the overall level, such as 3D modeling drawings, assembly drawings, part drawings, mechanical calculation curves, and stress distribution cloud maps, all of which must be clear, beautiful, and fully labeled. For this reason, I have invested a lot of effort in the writing process: in terms of part drawings and assembly drawings, I strictly follow the national drafting standards to ensure standardized use of dimension annotations, section lines, and symbols; In the display of simulation results, I use high-resolution screenshots and perform secondary processing if necessary to ensure the clarity and readability of the images; In the data curve drawing, I used MATLAB to complete it and added coordinate axis explanations and legends reasonably, making the results clear at a glance. Although these details have taken up a lot of time, they often have a "twice the result with half the effort" effect during the defense process.

**5.3 Language expression and logical structure.** Mechanical papers require concise, objective, and accurate language, avoiding colloquialism and ambiguity. For example, instead of writing "almost", "probably", or "possibly", use data and experimental results to support the viewpoint. In terms of logical structure, I follow the idea of "raising questions - analyzing problems - solving problems" to make the outline of the paper clear.

In the writing process, I often write an outline first and then expand it paragraph by paragraph. For example, in the "Research Methods" section, I will first list: ① Theoretical calculations; ② 3D modeling; ③ Finite element simulation; ④ Experimental verification. Then expand one by one, with each section unfolding in the order of "purpose method result analysis". Writing in this way not only makes the organization clear, but also facilitates later revisions.

**5.4 Communicate and revise with the supervisor.** Writing a thesis is never done in isolation. After the initial draft of my paper was completed, I made more than five revisions, and each revision was inseparable from the opinions of my supervisor. Mentors often point out shortcomings from a professional perspective, such as whether the formula derivation is complete, whether the simulation conditions are reasonable, and whether the conclusions are convincing. Although each revision is time-consuming, it has made significant progress in my academic expression.

In addition, I will also ask my classmates to help me read through and check for grammar errors and logical loopholes. It has been proven that multi angle review can greatly improve the quality of papers.

**5.5 Preparation for defense.** After the completion of the thesis writing, the defense is the final stage to verify the results. In order to prepare for the defense, I condensed my paper into a PPT, highlighting the research background, design methods, key achievements, and innovative points. At the same time, I have prepared possible questions in advance, such as "why choose this optimization method" and "how to verify the reliability of simulation results". Practice continuously during simulated defense to gain confidence and composure in formal situations.

On the day of the defense, the reviewing teacher was more concerned with whether you truly understood your work, rather than just the paper itself. Therefore, good thesis writing combined with clear oral expression is essential for a successful conclusion to the graduation project.

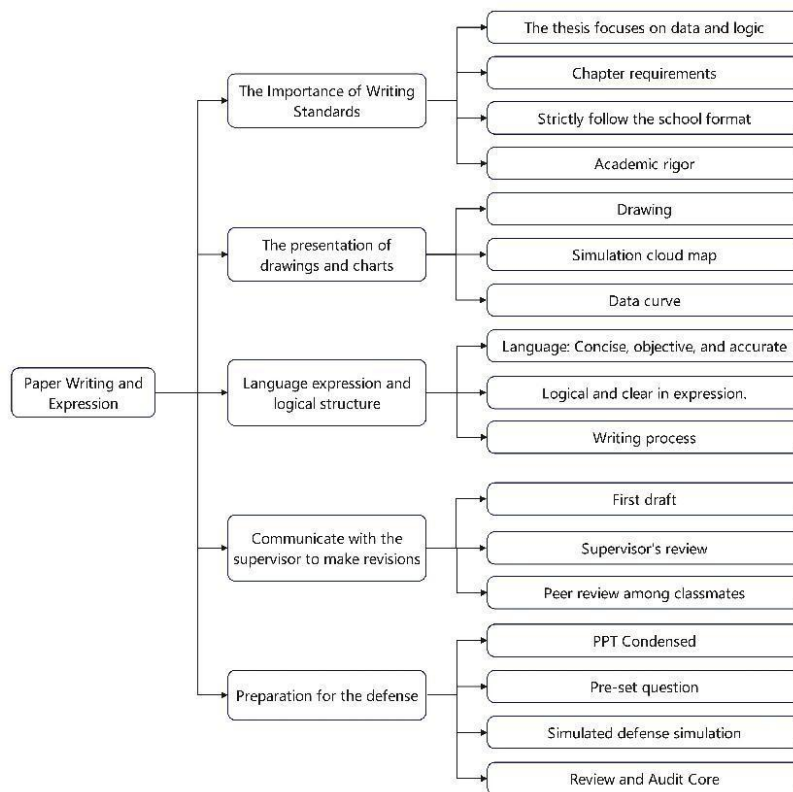


Figure 3. Structure diagram of paper writing and expression

### 6.Summary and Reflection

Graduation project is a long and fulfilling journey. From the initial topic selection to the final defense, I experienced confusion, pressure, perseverance, and growth. Looking back at the entire process, the gains far exceeded the paper itself. It gave me a deeper understanding of professional learning, engineering practice, and personal growth.

**6.1Improvement of learning ability.** Before graduation, I often felt that my four-year undergraduate studies were scattered and lacked connection. For example, "Principles of Machinery" discusses the laws of mechanism motion, "Mechanics of Materials" studies stress and strain, "Mechanical Manufacturing Technology" focuses on processing methods, and "CAD" emphasizes modeling skills. In the classroom, these courses appear to be independent and difficult to form as a whole. And my graduation project allowed me to truly connect this knowledge for the first time: theoretical calculations require knowledge of mechanics, modeling relies on CAD skills, simulation analysis uses numerical methods, and part design must follow manufacturing process specifications. It is through the practice of graduation that I have experienced the systematic nature of professional learning and developed my ability to integrate knowledge across disciplines.

In addition, graduation has also helped me develop the habit of self-directed learning. Faced with unfamiliar software, complex standards, and unfamiliar research fields, I must actively search for information and learn methods. This ability is more valuable than specific knowledge, as there will be more new problems encountered in future work.

**6.2Cultivation of engineering thinking and practical abilities.** Unlike pure theoretical learning, mechanical engineering graduation requires students to possess engineering thinking, which considers both theoretical correctness and practical feasibility when solving problems. For example, in optimizing design, I need to pursue lightweighting while also considering manufacturing costs and machining accuracy; In the experiment, I had to design an ideal plan while also facing equipment limitations and data errors.

These experiences have gradually made me understand that the value of an engineer lies not in proposing a "perfect solution", but in finding the "optimal solution" under limited conditions. This kind of compromise and balancing thinking is one of the most profound inspirations that Bi She has brought me.

**6.3 Growth in academic writing and expression.** In academic writing, I learned how to express ideas in academic language, how to use data and charts to support arguments, and how to comply with academic norms. Although I went through repeated revisions and meticulous adjustments during the process, it was precisely these trials that helped me develop a rigorous habit.

More importantly, I learned how to clearly present my results to others. Whether it's writing a thesis or giving a defense speech, we are required to simplify the complex research process into clear and understandable logic. The ability to 'explain knowledge clearly' is equally important in future work and research.

**6.4 Self shortcomings and improvement directions.** Based on my experience, I would like to give some advice to younger students who are about to graduate: first, prepare early and familiarize yourself with the relevant software and research directions in advance, and do not rush to get started after the topic is opened; When selecting a topic, it is important to focus on matching interests and abilities. Instead of blindly pursuing novelty, it is more important to find a direction that suits oneself, and not to be greedy for the big picture; In paper writing, we should adhere to writing while doing, timely recording the ideas and data during the process, rather than dragging the writing to the end; At the same time, it is important to value communication, maintain communication with mentors and classmates, and not work behind closed doors when encountering problems; Finally, it is important to adjust one's mindset. The significance of graduation lies in training and growth, rather than pursuing scientific breakthroughs. There is no need to be overly anxious when encountering setbacks.

**6.5 The significance of graduation.** For me, mechanical engineering graduation is not just an academic task, but also an experience of self-improvement and growth. It taught me how to face complex problems, how to manage time, how to withstand pressure, and how to express my thoughts. More importantly, it enabled me to complete a role transition between being a 'student' and an 'engineer'.

When I finally handed over the thick paper to my supervisor, I felt not only the ease of completing the task, but also a recognition and farewell to my four years of university study. My graduation project made me believe that no matter what challenges I face in the future, I have the ability to overcome them step by step.

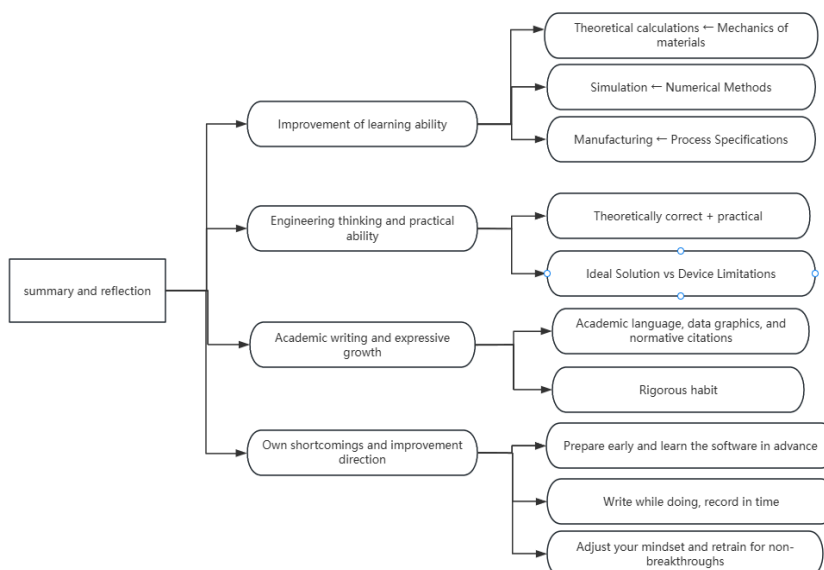


Figure 4. Structure diagram for summary and reflection

## 7. Conclusion

The graduation project in mechanical engineering is a process from ignorance to maturity, and it is also a ceremony of "moving towards engineers". It is not just a course task or an academic paper, but a comprehensive ability test and a mental growth experience.

During these months of graduation, I deeply realized that mechanical engineering is not just cold formulas and drawings, but it carries a rigorous way of thinking and pragmatic value orientation behind it. Every scrutiny of calculation parameters is a pursuit of precision; Every attempt at modeling and simulation is a simulation of the real world; Every failed experiment is a small step towards truth. It is these little efforts that gradually shaped my engineering literacy.

Looking back at the whole process, the biggest gain I felt was the recognition of my self-worth. Bi Shi told me: I don't need to stand at the highest point from the beginning, but I have the ability to complete complex tasks step by step; I may encounter failures and confusion, but I can also learn from them and start anew. It makes me more confident and certain about the future.

Therefore, for me, the mechanical graduation project is not only the "end" of college life, but also like a "colon" of a new stage of life. It not only ended the learning of student life, but also opened up the exploration of career paths. Whether pursuing further education or entering a company in the future, this experience will become a lighthouse in my heart, reminding me that only by being down-to-earth can I look up at the stars; Only by constantly learning can one not fear the future.

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