



Agricultural Mechanics: Fundamentals and Applications Updated, Precision Exams (7th Ed.)

Book by Dr. Ray V. Herren

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Abstract – Agricultural mechanics is perhaps one of the most widely taught courses within agricultural education programs. Agricultural education is constantly changing as new advances are made and new techniques and equipment are put into use. *Agricultural Mechanics: Fundamentals and Applications (7th ed.)* provides a thorough introduction to the field of agricultural mechanics. The text covers fundamental mechanical and engineering theory, common tools and materials, and practical applications, including shop orientation and procedures, woodworking and metalworking, tool fitting, project planning, cutting and welding, paints and paint application, power mechanics, electrical wiring, plumbing, hydraulics, concrete and masonry, and agricultural structures. Safety is also emphasized all through the text, and a dedicated unit introduces students to different career opportunities. The current edition also features new information on the National FFA Organization and SAEs, first aid, and engine-powered equipment, as well as new activities and lab exercises.

Keywords – Agricultural Education, Agriculture, Farm Machinery, Life Sciences, Science.

I. INTRODUCTION

Agricultural mechanics is one of the most widely taught courses in high school and post-secondary agricultural education programs. It is taught in all 50 states in the USA and is considered among the most useful courses in the curriculum. This discipline is constantly changing as new advances are made and new techniques and equipment are put into use. Ray Herren's textbook, *Agricultural Mechanics: Fundamentals and Applications (7th ed, 2019)*, has been for many years a standard text for students studying agricultural mechanics. The book addresses the specific needs of students enrolled in agriscience, production agriculture, ornamental horticulture, agribusiness, agricultural mechanics, and natural resources programs. All of these fields require basic knowledge and skills in mechanics for success in the corresponding career paths. The text starts with basic and general information, such as about career opportunities, and then provides instruction on basic mechanical skills and applications.

Almost all of the 43 units of the seventh edition have been revised to reflect the latest information and developments in the field of agricultural mechanics. Many of the revisions center on lab safety and the latest developments in safety techniques and equipment. For example, the unit on selecting and applying paint material has been enhanced to include the newer paint types. The unit on finishing wood has been revised to include information on newer finishes. The units on tractor maintenance and small engines have been similarly expanded with updated materials.

In addition, *Agricultural Mechanics: Fundamentals and Applications* uses high-quality color illustrations to clarify the written word. This edition contains over 350 new and updated illustrations and photographs that enhance the instructional material in the text. It also includes instructions on materials such as wood, sheet metal, structural steel, electrical wire, rust preventatives, wood preservatives, paint, and other finishes. It

encompasses procedures utilizing hand tools, portable power tools, and stationary power equipment as well as safety precautions for tool use. The selection and use of nails, screws, bolts, and glue are all discussed in detail. Processes explored in the book include woodworking, metalworking, electric and gas welding, heating and cutting, electrical wiring, electronics, robotics, pneumatics, plumbing, concrete and masonry work, and construction.

Throughout the textbook, the text is consistently formatted; it is easy to use for individualized instruction, easy to teach from, and simple enough for substitute teachers. Moreover, it offers easy methods to assess student progress. Each unit is part of a section, and each section includes 1) a statement of objective, 2) competencies to be developed, 3) a list of new terms, 4) a materials' list, 5) highly illustrated text material, 6) student activities, and 7) self-evaluation.

Herren has updated this edition to include relevant websites that provide more information on the unit topics. All new terms are carefully defined in the text as well as in the glossary. The appendices include 40 project plans with bills of materials and construction procedures. The projects have been carefully selected to match the skills covered in the text. The project plans include some projects that have become classics, some that cover targeted enterprises, and some that are new and innovative. The projects have also been chosen because they are used in high school agriculture/ agribusiness, agriscience, or related programs. The appendices include 36 tables containing information about estimating, planning, selecting, purchasing, and building in agricultural mechanics. The project plans, tables, glossary, and index provide unique reference materials that alone are worth the price of the text for many users. Additionally, an English-Spanish glossary with over 425 definitions provides an excellent study aid and reference for students.

Given below is a list of the updated and enhanced content of the seventh edition of *Agricultural Mechanics* that addresses the evolving agriscience curriculum:

- Updated statistics dealing with agricultural mechanics.
- Expanded coverage of safety using power hand tools, stationary power equipment, and other areas.
- Updated relevant websites at the end of each unit providing clearer search information in the event that web links change or become outdated.
- Integration of agricultural mechanization with plant, animal, and environmental sciences to provide students with a broad view of agriculture.
- Combination of theory with practice in every unit.
- Emphasis on mathematical skill development.
- Each unit has been updated to include the latest information on agricultural mechanics.
- Over 350 new and modernized illustrations and photographs offer improved detail and modern equipment related to small engines and power mechanics, plumbing, planning and constructing agricultural structures, and more. Moreover, the new photos depict actual high school students working in the agricultural mechanics' workshop.

The individual offerings of the textbook include an online learning platform, eBook, hardcover copy, resourc-

-es companion websites for instructors and students, teaching/learning package, and lab manual. To access the available materials, one will have to sign up for an account at login.cengage.com. Students can add the core textbook to their bookshelf using the 13-digit ISBN that appears on the back cover of the textbook [1].

The online learning platform provides access to students' homework assignments and other learning resources assigned to them through MindTap, WebAssign, SAM, OWLv2, CNOWv2, or Cengage Infuse. The eBook empowers students to read, highlight, take notes, and/or listen to the full textbook online. They can access it through their campus Learning Management System or offline through the Cengage Mobile app. The hardcover book provides the students with the option to rent or purchase the printed textbook. The resources companion websites include 1) Instructor Companion Site, which has materials including test banks, flashcards, PowerPoint presentations, instructor's manuals, and more and 2) Student Companion Site, which has materials that help students within their classroom experience.

The extensive teaching/ learning package is the complete supplement package developed to achieve two goals: 1) to assist students in learning the essential information needed to continue their exploration into the exciting field of agricultural mechanics and 2) to assist instructors in planning and implementing their instructional programs for the most efficient use of time and other resources. The Lab Manual to Accompany Agricultural Mechanics, 7th Edition is a comprehensive workbook that tests students' knowledge and reinforces their learning of text content. Job sheets for each unit outline an objective, tools, and materials needed and include a procedure with short-answer questions, procedural checklists, image labeling activities, or other activities to reinforce a student's comprehension of the unit content.

In conclusion, all instructors and students can benefit from *Agricultural Mechanics: Fundamentals and Applications* (7th ed, 2019) and its website resources. This textbook is extremely useful and would be a great tool to integrate into any college agricultural education course to teach students the skills necessary in the field of agricultural mechanics. I recommend this textbook to instructors as a tool to provide general information to students to help them prepare for successful careers in agricultural mechanics. The easy-to-read, easy-to-understand, highly illustrated text on modern agricultural mechanics is a plus for any agriscience program.

REFERENCES

- [1] Herren, R.V. (2019). *Agricultural mechanics: Fundamentals and applications* (7th ed., pp. 864). Cengage Learning, Inc. <https://www.cengage.com/> or <https://www.cengage.com/c/agricultural-mechanics-fundamentals-and-applications-updated-precision-exams-7e-herren/9781337918701/>
Bibliographic Information:-
Title: Agricultural Mechanics: Fundamentals and Applications Updated, Precision Exams
Author(s): Dr. Ray V. Herren
Edition: 7th Edition
Publisher: Cengage Learning, Inc.
Copyright: 2019
Publication: United States
Language: English
eTextbook: ISBN13: 9798214060880
Cost: \$39.95
Hardcopy: ISBN13: 9781337918701
Length/Format: 864Pages (Hardcover)
Dimensions: 1.5" x 8.9" x 11.2
Item Weight: 4.61 lbs.
Cost: \$142.95
Websites: 1. <https://www.cengage.com/>
- [2] <https://www.cengage.com/c/agricultural-mechanics-fundamentals-and-applications-updated-precision-exams-7e-herren/9781337918701/> Subjects: Science/Life Sciences/Agriculture



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Dr. Wandra Arrington, Assistant Professor of Agricultural economics and agribusiness in the department of agriculture at Alcorn State University. She teaches courses in the agricultural education unit, Social Sciences unit, and University College unit at Alcorn State University. She received her Bachelor of Science Degree in Business Administration and Master of Science Degree in Agriculture, specializing in Agriculture Economics from Alcorn State University. She also received a Ph.D. from Mississippi State University in Agricultural Science with an emphasis in agricultural & extension education from the College of Agriculture and Life Sciences. Her area of research is Agricultural & extension education, Agricultural Economics, and Agribusiness Management.