

# Heated Die Screw Press Biomass Briquetting Machine

Where modern heating and cooking fuels for domestic, institutional, commercial and industrial use are not readily available, briquettes made from biomass residues could contribute to the sustainable supply of energy. This study reviews the briquette making process, looking at the entire value chain starting from the type and characteristics of feedstock used for briquette making to the potential market for briquettes in developing countries. It also analyzes the role that gender plays in briquette production. Depending on the raw materials used and technologies applied during production, fuel briquettes come in different qualities and dimensions, and thus require appropriate targeting of different market segments. Key drivers of success in briquette production and marketing include ensuring consistent supply of raw materials with good energy qualities, appropriate technologies, and consistency in the quality and supply of the briquettes. Creating strong partnerships with key stakeholders, such as the municipality, financiers and other actors within the briquette value chain, and enabling policy are important drivers for the success of briquette businesses.

Torrefaction of Biomass for Energy Applications: From Fundamentals to Industrial Scale explores the processes, technology, end-use, and economics involved in torrefaction at the industrial scale for heat and power generation. Its authors combine their industry

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experience with their academic expertise to provide a thorough overview of the topic. Starting at feedstock pretreatment, followed by torrefaction processes, the book includes plant design and operation, safety aspects, and case studies focusing on the needs and challenges of the industrial scale. Commercially available technologies are examined and compared, and their economical evaluation and life cycle assessment are covered as well. Attention is also given to non-woody feedstock, alternative applications, derived fuels, recent advances, and expected future developments. For its practical approach, this book is ideal for professionals in the biomass industry, including those in heat and power generation. It is also a useful reference for researchers and graduate students in the area of biomass and biofuels, and for decision makers, policy makers, and analysts in the energy field. Compares efficiency and performance of different commercially available technologies from the practical aspects of daily operation in an industrial scale plant Presents a cost analysis of the production, logistics, and storage of torrefied biomass Includes case studies addressing challenges that may occur in the daily operation in an industrial scale plant Covers other associated technologies, the densification of torrefied biomass, and non-woody feedstock

This conference is the second such meeting under the auspices of the International Energy Agency's Bioenergy Agreement. The first IEA sponsored Fundamentals of Thermochemical Biomass Conversion Conference was held in Estes Park in 1982 and attracted 153 delegates

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from 13 countries around the world at a time when interest in biomass derived energy was at a peak. Since then oil prices have fallen considerably and with most prognoses for level prices until the end of the century, there has been a significant downturn in support for biomass conversion technologies. It has been particularly encouraging, therefore, to have received such an excellent response to this meeting. A total of 122 papers were offered, and 135 delegates registered for the conference from 19 countries. The theme of this meeting was Research in Thermochemical Biomass Conversion to reflect the advances made in research, development, demonstration and commercialisation since the Fundamentals meeting in 1982. The programme was divided into sections on fundamental research, applied research, and demonstration and commercial activities to emphasise the interaction and roles of all levels of research in supporting the eventual commercial implementation. The layout of the proceedings reflects this same pattern, with an introductory section on status and technoeconomics to identify opportunities and constraints in different parts of the world. All the papers included in these proceedings have been subjected to the usual peer review process to ensure the highest standards.

Renewable Energy and Green Technology: Principles and Practices is based on the present need to understand the principles and utility of renewable energy and green technology to minimize dependency on fossil fuels in global development. Renewable energy is the best and cheapest source of energy as an alternate

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resource. There is massive potential for renewable energy globally, including in India. The efficient utilization of renewable energy resources could minimize the impact of climate change globally. Generally, renewable energy is generated from essentially inexhaustible sources, including wind power, solar power, geothermal energy, tidal energy, biomass energy, and other sources. Hence, encouraging renewable energy use could save our tomorrow from the climate change perspective and in terms of sustainable food production. This book promotes the exchange of ideas, policy formulation, and collective action to ensure a smooth transition to renewable energy. It describes the technological interventions for reducing environmental and economic damage resulting from the use of conventional energy sources. In this book, the focus is on utilizing various renewable energy sources in diverse sectors. It also elaborates the descriptive methodology of different renewable energies, accompanied by figures and tables. It provides information on biogas energy plants, gasifier technologies, and hydropower technologies, among others, along with their applications. Further, it delves into energy concepts and details significant advantages of the energy resources for sustaining the future world. Lastly, this book will provide instant access to comprehensive, cutting-edge knowledge, making it possible for academicians and researchers to utilize this ever-growing wealth of information. Key features

Emphasizes the understanding of the principles and utility of renewable energy and green technology to minimize dependency on fossil fuels in the era of global

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development Focuses on recent trends in renewable energy with principles and practices in relation to climate change Highlights advanced approaches for sustainable use of renewable energy sources Illustrates the methodology for various aspects of renewable energy with figures and charts Discusses the green technology usages of the agriculture and forestry sectors Provides comprehensive cutting-edge information for policymakers in the field of renewable energy This book is to provide in-depth information on fundamentals of different renewable energy resources. The primary emphasis is on fundamentals of thermodynamics and heat transfer aspects of renewable energy gadgets and their actual applications. Various renewable energy systems are described and their fundamental analyses are described. Note: T&F does not sell or distribute the hardback in India, Pakistan, Nepal, Bhutan, Bangladesh and Sri Lanka. This title is co-published with NIPA.

This book is a printed edition of the Special Issue "BioEnergy and BioChemicals Production from Biomass and Residual Resources" that was published in Energies The book provides information on recent advancements in bioenergy engineering to graduates, post-graduates, research scholars, faculty members, academician, researchers and practitioners studying and working in field of the bioenergy engineering. It is an invaluable information resource on biomass-based biofuels for fundamental and applied research, catering to researchers in the areas of biogas technology, densification techniques, biomass gasification,

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torrefaction of biomass, biochar production, micro algae production, improved biomass cookstoves, bio-ethanol production and the use of microbial processes in the conversion of biomass into biofuels. It will also be useful to faculties and researchers to understand the present status, advancements and policies in implementation of bioenergy technologies in India. This book will definitely provide a direction to the young researchers in identification of thrust areas of research in the field of bioenergy. The book concludes with research and development endeavours and aspects relating to implementation of advance bioenergy technologies. Zambia is richly endowed with a wide range of biomass sources including woodlands, forests, agricultural residues and livestock waste. Biomass energy contributes supplies over 70 percent of the country's energy needs. Due to the current extraction and consumption methods, the use of biomass energy has been linked with detrimental environmental effects such as deforestation and forest degradation as well as climate change, due to the loss of carbon sinks. Inefficient utilisation of biomass contributes significantly to deforestation which is estimated at between 79 000 – 150 000 ha per year, and negatively affects the health and income of rural households that depend on forest products for their livelihoods. Sustainable bioenergy strategies and alternative bioenergy solutions need to be defined and integrated into current efforts of the country to increase stable and sustainable access to energy. This report assesses the country context and defines which bioenergy options can be viable considering a

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number of solutions for electricity production, cooking fuels and transport fuels at the provincial and district level. Possible options originating from crop residues, livestock residues and forest plantation harvesting residues are identified, having netted out agriculture and forestry needs. The assessment now needs to be followed by local verification and investment to deploy an initial set of bioenergy projects and test the findings on the ground.

Gasification involves the conversion of carbon sources without combustion to syngas, which can be used as a fuel itself or further processed to synthetic fuels. The technology provides a potentially more efficient means of energy generation than direct combustion. This book provides an overview of gasification science and engineering and the production of synthetic fuels by gasification from a variety of feedstocks. Part one introduces gasification, reviewing the scientific basis of the process and gasification engineering. Part two then addresses gasification and synthetic fuel production processes. Finally, chapters in part three outline the different applications of gasification, with chapters on the conversion of different types of feedstock. Examines the design of gasifiers, the preparation of feedstocks, and the economic, environmental and policy issues related to gasification Reviews gasification processes for liquid fuel production Outlines the different applications of gasification technology

This textbook covers the entire gamut of project scoping, identification, development and appraisal and is primarily designed to meet the requirements of postgraduate

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students of management and engineering education. Researchers, consultants, policy makers and professionals in project management will find it a good body of knowledge as a reference source. The objective of the book is to provide a multidisciplinary grounding to the readers so that they can develop all the skills and competencies required to view or manage the entire project management process as an integrated whole. The book has been written in an easy-to-understand style and uses live case studies of renewable energy projects to illustrate the concepts, so that the students/readers understand them in the context of the real world. Though based on renewable energy projects, majority of the concepts explained in the book are applicable to other industrial projects equally – detailed guidance and notes on this aspect is given appropriately in the book.

This book is a thoroughly up-to-date treatment of all the available technologies for biomass conversion. Each chapter looks at the viability and implementation of each technology with examples of existing equipment and plants. In addition, the text addresses the economics of biomass processing. The book could also be used as a supplementary text for senior undergraduate courses on biomass processing.

The Forests are playing a significant role in the economic prosperity and ecological stability of the country. The Indian Forests faces severe biotic and abiotic pressure leads to shrinking of its geographical distribution and the forest based industries are at the cross roads. This book incorporated the India's Forest and Agroforestry situation

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and the need for industrial wood plantations. It also comprises the status of various wood based industries like pulp and paper, plywood, matchwood, dendro power, biofuel and the requirement for different raw materials and the associated supply chain management.

Environmental and energy dependency problems derived from high fossil fuels consumption have made necessary the development of new energy models to be renewable and sustainable, efficient, practical and economical, and cost effective, to meet the demand for a sustainable energy supply. Among renewable resources, biomass is destined to play an important role in these new energy models since agricultural and forestry residues are an energy resource which is produced in relatively large amounts throughout the world and regarded as a renewable and environmentally safe way of providing energy. Compiling information on the conversion of energy from biomass, the book focuses on the use of pellets as homogeneous solid biofuels. It describes all the changes that forestry and agricultural biomass undergo to be converted into thermal energy and analyses the inputs and outputs of the process. It has to be noted that the standards used as guidelines and references in all the chapters of the book are there in order to not to forget the thresholds and guidelines established and thus to ensure a proper use. This book guides the reader through the entire biomass-to-energy process, emphasising important aspects and how the quality of the biofuel can be identified. It acts as a starting point for professionals and researchers interested in working with biomass and a guide for those

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people interested in the implementation of the technologies described.

"How can the European Union meet its binding 20% renewable energy target in final energy consumption by the year 2020? Which sources offer the best prospects for realizing this goal? These are the questions answered by this key book which analyses the current situation of renewable energy in Europe, examines the latest technological, financial and economic developments, and outlines ways in which the renewable energy market can be developed. The book is divided into sections examining the integration of renewable energy, electricity, heating and cooling as well as biofuels. All the main technologies are covered, with exploration of: benefits and applications; costs and prices; markets and installed capacity; policy instruments; key countries and success stories; and targets and long term potential. This will be essential reading for policy decision-makers at all levels and to all those involved in the development of the renewable energy industry."--Publisher's description.

This open access book on straw management aims to provide a wide array of options for rice straw management that are potentially more sustainable, environmental, and profitable compared to current practice. The book is authored by expert researchers, engineers and innovators working on a range of straw management options with case studies from Vietnam, the Philippines and Cambodia. The book is written for engineers and

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researchers in order to provide them information on current good practice and the gaps and constraints that require further research and innovation. The book is also aimed at extension workers and farmers to help them decide on the best alternative straw management options in their area by presenting both the technological options as well as the value chains and business models required to make them work. The book will also be useful for policy makers, required by public opinion to reduce greenhouse gas emissions and air pollution, looking for research-based evidence to guide the policies they develop and implement.

Biomass use is growing globally. Biomass is biological material derived from living, or recently living organisms. It most often refers to plants or plant-based materials which are specifically called lignocellulosic biomass. Biomass (organic matter that can be converted into energy) may include food crops, crops for energy, crop residues, wood waste and byproducts, and animal manure. It is one of the most plentiful and well-utilized sources of renewable energy in the world. Broadly speaking, it is organic material produced by the photosynthesis of light. The chemical materials (organic compounds of carbons) are stored and can then be used to generate energy. The most common biomass used for energy is wood from trees. Wood has been used by humans for producing energy for heating and cooking for a very

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long time. As an energy source, biomass can either be used directly via combustion to produce heat, or indirectly after converting it to various forms of biofuel. Conversion of biomass to biofuel can be achieved by different methods which are broadly classified into: thermal, chemical, and biochemical methods. Biomass gasification is the conversion of solid fuels like wood and agricultural residues into a combustible gas mixture. The gasification system basically consists of a gasifier unit, a purification system and energy converters- burner or engine. This book offers comprehensive coverage of the design and analysis of biomass gasification, the key technology enabling the production of biofuels from all viable sources like sugar beet and sweet sorghum. It aims at creating an understanding of the nature of biomass resources for energy and fuels, the variety of processes that are available for conversion of the wastes into energy or fuels. The book discusses the overview of the Biomass Energy along with their Properties, Composition, Benefits, Characteristics and Manufacturing Process of Biomass based products. Also it contains suppliers contact details of plant & machinery with their photographs. The content includes biomass renewable energy, prospective renewable resources for bio-based processes, biochemical from biomass, biomass based chemicals, biofuel production from biomass crops, biomass gasification, reuse of bio-

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genic iron oxides and woody biomass fly ash in cement based materials and agricultural areas, biofuel briquettes from biomass, biomass based activated carbon, environmental aspects. It will be a standard reference book for Professionals, Decision-makers, Engineers, those studying and researching in this important area and others interested in the field of biomass based products. Professionals in academia and industry will appreciate this comprehensive and practical reference book, due to its multidisciplinary nature.

This book takes the reader on a journey from the moment that raw wood material enters the factory to the final pellet consumption. It starts by reviewing biomass application and its role for the future development of renewable energies, discussing different biomass conversion methods as alternatives to direct utilization. The second chapter then comprehensively examines densification processes, with a focus on the pelleting process. Chapter three further elaborates on the pelleting process, including an overview of the pellet structure and properties, and the history of this process. The subsequent chapters provide a detailed account of the production process from raw material delivery to final distribution, addressing the chemical and physical quality, and presenting measurement methods and standards. In the final chapters, the authors describe in detail the pellet combustion

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process and emissions.

The content of book includes all major aspects of biomass production and efficient utilization for energy generation. Most of the information presented in this book reflects a basis to acquire the understanding of the proper utilization of biomass for heat and power generation. In this book, design criteria, present state of art of technology and future perspective of clean energy are illustrated through graphs, figures, tables, flowcharts. equations etc. to make the subject more clear and useful. Note: T&F does not sell or distribute the hardback in India, Pakistan, Nepal, Bhutan, Bangladesh and Sri Lanka. This title is co-published with NIPA.

The World Renewable Energy Congress is a key event at the start of the 21st century. It is a vital forum for researchers with an interest in helping renewables to reach their full potential. The effects of global warming and pollution are becoming more apparent for all to see - and the development of renewable solutions to these problems is increasingly important globally. If you were unable to attend the conference, the proceedings will provide an invaluable comprehensive summary of the latest topics and papers.

Sustainable Industrial Design and Waste Management was inspired by the need to have a text that enveloped awareness and solutions to the ongoing issues and concerns of waste generated

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from industry. The development of science and technology has increased human capacity to extract resources from nature and it is only recently that industries are being held accountable for the detrimental effects the waste they produce has on the environment. Increased governmental research, regulation and corporate accountability are digging up issues pertaining to pollution control and waste treatment and environmental protection. The traditional approach for clinical waste, agricultural waste, industrial waste, and municipal waste are depleting our natural resources. The main objective of this book is to conserve the natural resources by approaching 100 % full utilization of all types of wastes by cradle – to - cradle concepts, using Industrial Ecology methodology documented with case studies. Sustainable development and environmental protection cannot be achieved without establishing the concept of industrial ecology. The main tools necessary for establishing Industrial Ecology and sustainable development will be covered in the book. The concept of “industrial ecology will help the industrial system to be managed and operated more or less like a natural ecosystem hence causing as less damage as possible to the surrounding environment. Numerous case studies allow the reader to adapt concepts according to personal interest/field Reveals innovative technologies for the conservation of

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natural resources The only book which provides an integrated approach for sustainable development including tools, methodology, and indicators for sustainable development

The consumption of petroleum has surged during the 20th century, at least partially because of the rise of the automobile industry. Today, fossil fuels such as coal, oil, and natural gas provide more than three quarters of the world's energy. Unfortunately, the growing demand for fossil fuel resources comes at a time of diminishing reserves of these nonrenewable resources. The worldwide reserves of oil are sufficient to supply energy and chemicals for only about another 40 years, causing widening concerns about rising oil prices. The use of biomass to produce energy is only one form of renewable energy that can be utilized to reduce the impact of energy production and use on the global environment. Biomass can be converted into three main products such as energy, biofuels and fine chemicals using a number of different processes. Today, it is a great challenge for researchers to find new environmentally benign methodology for biomass conversion, which are industrially profitable as well. This book focuses on the conversion of biomass to biofuels, bioenergy and fine chemicals with the interface of biotechnology, microbiology, chemistry and materials science. An international scientific authorship summarizes the state-of-the-art

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of the current research and gives an outlook on future developments.

How can the European Union meet its binding 20% renewable energy target in final energy consumption by the year 2020? Which sources offer the best prospects for realizing this goal? These are the questions answered by this key book which analyses the current situation of renewable energy in Europe, examines the latest technological, financial and economic developments, and outlines ways in which the renewable energy market can be developed. The book is divided into sections examining the integration of renewable energy, electricity, heating and cooling as well as biofuels. All the main technologies are covered, with exploration of: ' benefits and applications ' costs and prices ' markets and installed capacity ' policy instruments ' key countries and success stories ' targets and long term potential This will be essential reading for policy decision-makers at all levels and to all those involved in the development of the renewable energy industry.

This book provides a comprehensive coverage of all the major issues concerning biomass energy

Renewable Energy Engineering and Technology: Principles and Practice - covers major renewable energy resources and technologies for various applications. The book is conceived as a standard reference book for students, experts, and policy-makers. It has been designed to meet the needs of these diverse groups. While covering the basics of scientific and engineering principles of thermal engineering, heat and mass transfer, fluid dynamics, and renewable energy resource assessments, the book further deals with the basics of applied technologies and design practices for following renewable energy resources.- Solar (thermal and photovoltaic)- Wind - Bio-energy including liquid biofuels and

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municipal solid waste- Other renewables such as tidal, wave, and geothermalThe book is designed to fulfil the much-awaited need for a handy, scientific, and easy-to-understand comprehensive handbook for design professionals and students of renewable energy engineering courses. Besides the sheer breadth of the topics covered, what makes this well-researched book different from earlier attempts is the fact that this is based on extensive practical experiences of the editor and the authors. Thus, a lot of emphasis has been placed on system sizing and integration. Ample solved examples using data for India make this book a relevant and an authentic reference.

Bioenergy: Principles and Technologies introduces biomass energy resources and then elaborates on bioenergy technologies including biomass combustion, biogas production, biomass briquettes and biomass gasification. With a combination of theories, experiments and case studies, the book is an essential reference for bioenergy researchers, industrial chemists and chemical engineers.

The book on “Forestry Technologies – A Complete Value Chain Approach” has been designed to cater to the needs of the stakeholders by judiciously incorporating the recent technologies and research outputs available in various sectors of institutions. The book has four major themes viz., basic and strategic technology, production technology, processing and value addition technology and consumption technology. The basic and strategic technology incorporated seven chapters which include basic information and the recent scientific applications such as: nano technology and urban forestry technology. The production technology incorporated 16 chapters that includes all the recent developments such as: mini clonal technology, high yielding short rotation variety, land development and precision silvicultural technology, and multifunctional agroforestry.

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Processing and value addition technology incorporated 11 chapters and the consumption technology incorporated five chapters which include the recent developments in processing, value addition and the associated supply chain process. In a holistic perspective, the current book will serve as a readymade reference material to the practicing foresters, scientific professionals, wood based industries, policy makers, forestry students, financial and other academic and research institutions.

This book presents an integrated and multidisciplinary approach to quality and innovation in the food sector with particular emphasis on consumer perception of quality. Chapters cover such topics as identification of environmental variables, practices crops, and cultivars to improve nutritional and functional quality of different food matrices; increased preservation of biodiversity through the use of genetic resources; nutritional and functional characterization of food matrices; and evaluation of the main bioactive substances that give food its functional qualities.

This monograph discusses the various biomass feedstocks currently available for biofuels production, and mechanical preprocessing technologies to reduce the feedstock variability for biofuels applications. Variability in the properties of biomass—in terms of moisture, particle size distribution, and low-density—results in storage, transportation, handling, and feeding issues. Currently, biorefineries face serious particle bridging issues, uneven discharge, jamming of equipment, and transportation problems. These issues must be solved in order for smooth operations to be possible. Mechanical preprocessing technologies, such as size reduction, densification, and moisture management using drying and dewatering, can help to overcome these issues. Many densification systems exist that will assist in converting low-density biomass to a high-density commodity type feedstock.

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In 6 chapters, the impact of densification process variables, such as temperature, pressure, moisture, etc., on biomass particle agglomeration, the quality of the densified products, and the overall energy consumption of the process are discussed, as are the various compression models for powders that can be used for biomass particles agglomeration behavior and optimization of the densification process using statistical and evolutionary methods. The suitability of these densified products for biochemical and thermochemical conversion pathways is also discussed, as well as the various international standards (CEN and ISO) they must adhere to. The author has worked on biomass preprocessing at Idaho National Laboratory for the last ten years. He is the principal investigator for the U.S. Department of Energy Bioenergy Technologies Office-funded “Biomass Size Reduction and Densification” project. He has developed preprocessing technologies to reduce cost and improve quality. The author has published many papers and books focused on biomass preprocessing and pretreatments. Biomass process engineers and biorefinery managers can benefit from this book. Students in chemical, mechanical, biological, and environmental engineering can also use the book to understand preprocessing technologies, which greatly assist in improving the biomass critical material attributes. The book can help policymakers and energy systems planners to understand the biomass properties limitations and technologies to overcome the same.

This book collects the edited and reviewed contributions presented in the 3rd International Conference on Renewable Energy: Generation and Applications” ICREGA’14, organized by the UAE University in Al-Ain. This conference aims to disseminate knowledge on methods, policies and

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technologies related to renewable energy and it acknowledges the leadership of the UAE which committed to a 7% renewable energy target by 2020. The demands and developments in renewable energy generations and applications are rapidly growing and are facing many challenges on different levels such as basic science, engineering system design, energy policies and sustainable developments. This edition presents new contributions related to recent renewable energy case studies, developments in biofuel, energy storage, solar and wind energy, integrated systems and sustainable power production. In the spirit of the ICREGA'14, the volume has been produced after the conference so that the authors had the possibility to incorporate comments and discussions raised during the meeting. The contributions have been grouped in the following topics: - Efficient Energy Utilization - Electrical Energy Market, Management and Economics - Energy Storage Systems - Environmental Issues - Fuel Cells Systems - Green Buildings - Intelligent Energy/Power Transmission and Distribution - Solar Photovoltaic and Thermal Energy - Wind Energy Systems.

Agglomeration is integral to the processes of modification of powders, production of composites and creation of new materials which are required in pharmaceuticals, foods, chemicals, fertilizers and agrochemicals, minerals, ceramics, metallurgy and

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all material producing industries. The binding mechanisms and the particle behavior as well as the characteristics of the processes and the resulting agglomerates are the same whether they are occurring in the 'ultra-clean' pharmaceutical or food industries or in 'dirty' minerals or waste processing plants. The book introduces the interdisciplinary approach to the development of new concepts and the solution of problems. It is a complete and up-to-date practical guide describing the various agglomeration phenomena and industrial techniques for size enlargement. In addition to introducing the properties of agglomerates and the characteristics of the different methods, descriptions of the machinery and discussions of specific equipment features are the main topics. The detailed evaluation of the subject is based on the authors experience as student, researcher, teacher, developer, designer, vendor, and user as well as expert and consultant in the field of agglomeration, its technologies and products, and is complemented by the know-how of colleagues who are active in specific areas and information from vendors. It is intended for everybody working in industries that process and handle particulate solids as it aims to help understand and control unwanted agglomeration as well as use, improve, and develop methods for the beneficial size enlargement by agglomeration. Solid biofuels, in different trading forms, constitute

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an integral component of the energy mix of almost all developed and developing countries. Either in the form of pellets, briquettes, chips, firewood, or even as raw feedstock, solid biofuels are used mainly in the heating and power sector. Numerous sustainability concerns, focusing on the environmental, economic and technical aspects of solid biofuels exploitation, led to considerable advances in the recent years in this field. These developments mainly focus on the pre-treatment processes of the solid biomass to biofuels chain, the minimum requirements of the produced solid biofuels, as well as the efficiency and the environmental performance of their thermochemical conversion routes. This work aspires to provide the state of the art in the field of the exploitation of solid biofuels to present the main advances as well as the major challenges of this scientific fields. The topics presented in this book were examined and dealt with by the authors in the past few years, in numerous research projects and scientific publications. This book compiles all the assembled experience of the past few years, and aims to provide an overview of the solid biofuels exploitation field. Presents the latest standards and considerations on solid biofuels technical requirements; Contains numerous examples on applications in the field of solid biofuels thermochemical conversion, as well as the state of the art in this field; Includes sustainability aspects,

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including life cycle assessment aspects and financial concerns for the exploitation of solid biofuels.

Global food security is a challenging issue. Meeting the food and nutritional requirements of the world has become an issue for national policymakers and is of public concern. There is a need to enhance agricultural production, as well as, to reduce postharvest loss, improve the quality of processed products, and add value to products to make more quality food available. Agro-product processing technology plays a major role to reduce post-harvest losses, improve the quality of processed products, and add value to the products. It also generates employment and ultimately contributes to food security. Features: Covers a wide spectrum of agro-product processing technology Explains the principles and practices of agro-product processing technology with many worked examples to quickly teach the basic principles through examples Contains examples from different operations on current problems to show the wide applications of the principles of agro-product technology Includes process control and emerging technologies in agro-product processing such as energy and exergy analysis, neural network modeling, and CFD modeling This book deals with physical and thermal properties, cleaning and sorting, drying and storage, parboiling and milling, by-product utilization, heating and cooling, refrigerated cooling, and cold storage.

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The most unique feature of this book is the machine vision for grading fruits, process control and materials handling, and emerging technologies such as neural network, finite element, CFD, and genetic algorithm.

The present multicolor edition has been thoroughly revised and brought up-to-date. Multicolor pictures have been added to enhance the content value and to give the students an idea of what he will be dealing in reality, and to bridge the gap between theory and practice. This book has already been included in the 'suggested reading' for the A.M.I.E. (India) examinations.

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