



ALMA MATER STUDIORUM
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Banche dati per l'ingegneria

Rosalia Miceli

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Ingegneria e Architettura

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- Dizionario Tecnico Marolli e Manuale dell'ingegnere Nuovo Colombo su piattaforma eLexico
- ASTM Compass
- SAE Mobilus
- ASM handbooks

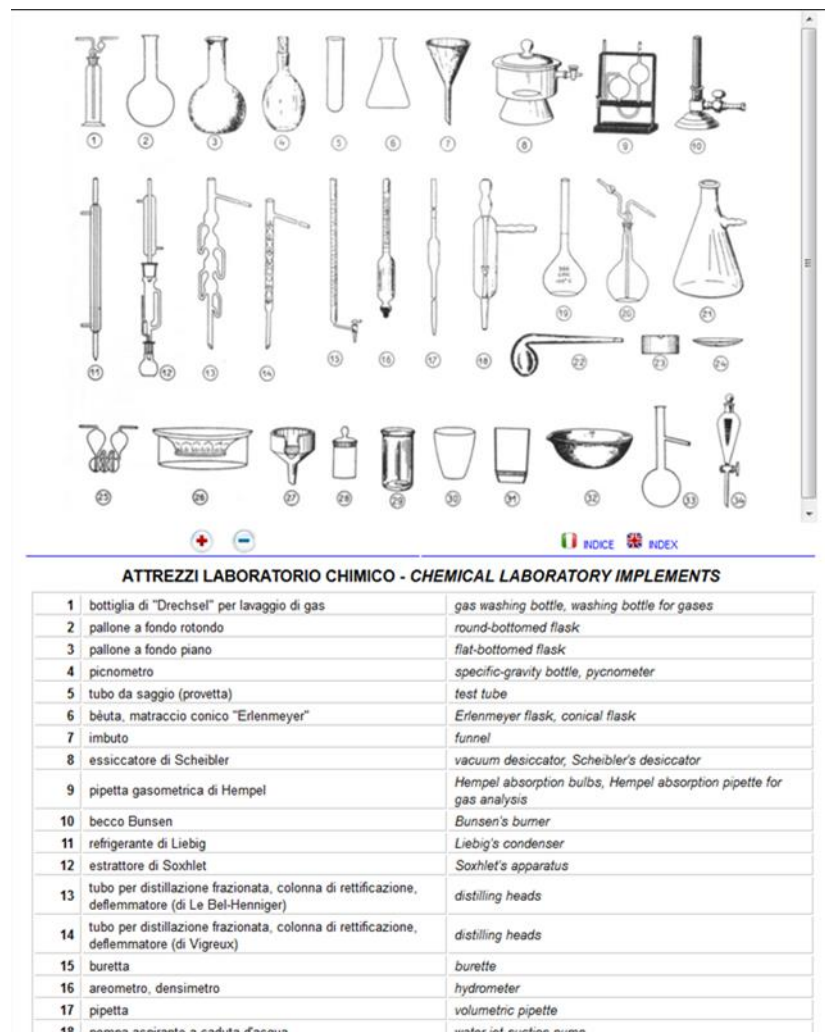


Manuale dell'ingegnere 2.0 e Dizionario tecnico Nuovo Marolli



Nuovo Marolli

- 215.000 lemmi
- selezione della terminologia di base riguardante i settori commerciale, amministrativo e aziendale
- 40 tavole grafiche online con nomenclatura specialistica



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closing

closure

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cloth

clothbound

clothing

clothworker

clotoide

clotting

clot (to)

cloud

GRANDE DIZIONARIO TECNICO INGLESE HOEPLI

cloruro

• (chim.), chloride.

cloruro d'ammonio (NH₄Cl) (chim.), ammonium chloride, salt ammoniac.

cloruro d'argento (AgCl) (chim.), silver chloride.

cloruro di calcio (CaCl₂), calcium chloride.

cloruro di etile (C₂H₅Cl) (med. - chim.), ethyl chloride.

cloruro di metile (CH₃Cl) (chim.), methyl chloride.

cloruro di platino (chim. fot.), platinochloride.

Ricerca istantanea: "cloruro"

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elettrici per es.) (chim. -

it.

monomer, vedi CVM.

) (chim. - mft. carta - ecc.),

Posizione nella lista: 9940 / 30917

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1 voce trovata

GRANDE DIZIONARIO TECNICO INGLESE HOEPLI

ONLINE PLATES

 **edgewater**

(*min.*), acqua sottostante i giacimenti di petrolio.

Selezione degli ambiti

accumulatori

acustica

aerodinamica

aeronautica

aeronautica militare

aerotecnica

agricoltura

amministrazione

animazione, cinema

apparati, dispositivi

architettura

assicurazione

astrofisica

astronautica

astronomia

atmosferico

atomo, atomico

attrezzatura, equipaggiamento

audiovisivi

automazione

automobilismo

biochimica

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Manuale dell'ingegnere ieri e ...

Comunemente chiamato «il Colombo» tra gli ingegneri.

La prima edizione viene pubblicata da Giuseppe Colombo, direttore del Politecnico di Milano, nel 1877. Rappresenta il primo tentativo di predisporre un «*manuale di ingegneria succinto e tascabile*» in lingua italiana ... era 260 pagine

L'85ª edizione cartacea del Nuovo Colombo del 2012, redatta con i contributi di circa 240 esperti autori, contava 7000 pagine, con 4000 figure e 2000 tabelle e copriva tutti i principali argomenti necessari alla formazione dell'ingegnere



... oggi Nuovo Colombo digitale 2.0

Grande rinnovamento della storica opera prevede il progressivo e costante aggiornamento in base alle variazioni tecnologiche e normative, l'arricchimento con allegati tecnici e strumenti di calcolo forniti dagli autori

A partire dalla 85^a edizione, infatti, tutto il materiale (testo, tabelle, schemi e immagini) è stato digitalizzato e un team di autori – sotto la direzione dell'Ing. Pierluigi Riva – ne ha iniziato l'opera di aggiornamento, destinata a rivedere nel tempo l'intera struttura del Colombo.



Nuovo Colombo - Contenuti

- Matematica, topografia, estimo
- Ingegneria chimica
- Fisica applicata
- Ingegneria industriale
- Materiali e loro proprietà
- Elettrotecnica
- Scienza delle costruzioni
- Elettronica, telecomunicazioni
- Ingegneria edile
- Fonti energetiche rinnovabili
- Ingegneria meccanica
- Ingegneria gestionale
- Ingegneria dei trasporti
- Ingegneria ambientale
- Idraulica e costruzioni idrauliche
- Qualità, sicurezza



Nuovo Colombo – modalità di consultazione

- tramite l'uso del **sommario** generale e degli indici delle sezioni e dei capitoli, fino a individuare il documento corrispondente all'argomento scelto;
- tramite la ricerca nei campi **Tutto testo** e delle **Parole chiave** assegnate a ogni documento in base all'argomento trattato.
- Se vengono riempiti più campi, la ricerca viene soddisfatta dalle voci in cui compaiono tutte le condizioni poste.



Ricerche avanzate

- Per ricercare espressioni composte da più parole, racchiudere le parole tra virgolette.

Nel campo **“Tutto testo”**, per cercare un'intera frase è necessario racchiuderla tra virgolette; due o più parole (non racchiuse tra virgolette) separate da uno spazio sono considerate in OR tra loro (il risultato è formato dai documenti in cui compare almeno una delle parole); due o più parole (non racchiuse tra virgolette) separate dall'operatore **&&** sono considerate in AND tra loro (il risultato è formato dalle voci in cui compaiono tutte le parole).

Nel campo **“Parole chiave”**, più parole sono automaticamente considerate in AND tra loro (il risultato è formato dalle voci in cui compaiono tutte le parole chiave).

In ogni campo di input è possibile utilizzare i normali **caratteri jolly**: * (qualsiasi numero di caratteri) e ? (un solo carattere).



- Nella finestra del documento (in basso), le parole trovate sono evidenziate in giallo
- Cliccando con il pulsante destro del mouse su una qualsiasi parola si apre una piccola finestra di popup con i risultati della ricerca istantanea di quella parola in tutti i campi disponibili.
- I collegamenti ipertestuali tra i documenti o gli apparati sono indicati in blu e dal cambiamento nella forma del cursore del mouse.
- Figure e tabelle vengono visualizzate in due finestre di popup che si aprono cliccando il relativo collegamento.



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Ingegneria dei trasporti
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Armamento

Sono: quercia lanuginosa, rovere, farnia, cerro, pino silvestre e pino silano. Le traverse in rovere e in farnia senza alborno sono generalmente messe in opera allo stato naturale, senza preventivo trattamento conservativo di speciale antisettico (*impregnazione*); questo trattamento è comunque sempre consigliabile; le altre traverse in essenze diverse dalle sopracitate devono essere impregnate. La forma, le dimensioni, le tolleranze dimensionali e di forma, le caratteristiche del legno e dell'olio di impregnazione, le modalità di esecuzione del trattamento, le condizioni tecniche della fornitura sono indicate nella sopraccitata UNI 7407.

Le traverse in acciaio

Hanno forma  con larghezza alla base di ≈ 120 mm; in Italia sono molto scarsamente impiegate; assai più usate all'estero, non consentono velocità superiori ai 100 km/h.

Le traverse in cemento armato

Sono impiegate dalle FS sono di tipo monoblocco in conglomerato cementizio precompresso, con armatura in tondini di 7 mm di diametro, in acciaio ad alto limite elastico, ai quali, all'atto della fabbricazione delle traverse, viene data una tensione iniziale prestabilita. Vengono costruite in due lunghezze di 2,30 m e 2,60 m. Sono usate in tutte le nuove costruzioni e nel rinnovo dell'armamento delle linee principali. Nelle gallerie di metropolitane va generalizzandosi l'uso del supporto cementizio, cioè le rotaie sono ancorate, con interposizione di mezzi elastici, direttamente all'arco rovescio della galleria; il fissaggio è fatto con spinotti ancorati al cemento tramite resine epossidiche (Fig. 6 [in [Linee di contatto per trazione elettrica](#)]).

Materiale minuto d'armamento

Sono gli elementi con i quali le rotaie vengono collegate fra loro o fissate alle traverse; i primi comprendono: le *ganasce*, le *chiavarde di giunzione* e le *rosette elastiche*; i secondi comprendono: le *piastre*, i *piastroni*, le *piastrene di stringimento* e di *distanziamento*, le *chiavarde d'ancoraggio*, le *caviglie*, le *tavolette* e le *piastre di gomma sottorotaia*. Tutti i suddetti materiali sono unificati (norme UNI da 3551 a 3562 e 3572). Per le rotaie tranviarie a gola il materiale minuto consta di: *piastre*, *ganasce*, *caviglie*, *chiavarde per giunzione delle rotaie*, *traverse di scartamento* e *chiavarde per dette traverse* (UNI da 3694 a 3699); la tabella UNI 3562 indica i materiali minuti d'armamento da usare per le varie rotaie unificate.

Distanziamento delle traverse e sfalsamento delle giunzioni



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Le traverse in cemento armato

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Distanziamento delle traverse e sfalsamento delle giunzioni

Ricerca istantanea: "conglomerato"

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Elettrotecnica

Linee elettriche

Linee aeree

sovratemperatura accettata, dalle condizioni di ra

sezione stessa. Solitamente è il criterio più restritt

conduttori di rame nudo v. [Tab. 1](#).

🔍

Tab. 1. Valori orientativi delle co

e) Al riscaldamento in sovraccarico.

f) Al riscaldamento in cortocircuito.

Per questi ultimi due criteri v. CEI 64-8.

Per i cavi v. [Linee elettriche sotterranee](#).

Materiali per conduttori

Dati in [Tab. 2](#).

🔍

Tab. 2. Caratteristiche fisiche e

Norme di legge

La costruzione e l'esercizio delle linee elettriche a

legge 13.12.1964 n. 1341, recante norme tecniche

come regolamento di esecuzione, le Norme CEI 11

è stata apportata dal CEI la variante V1 (1979).

Sezioni e formazioni normali dei conduttori

Nuovo Colombo 2.0 - Tabelle - Mozilla Firefox

www.edigeo.it/hpcol20/Tabelle/TM05-1_1.html

Tab. 1. Valori orientativi delle correnti ammissibili per conduttori nudi di rame di linee elettriche aeree.

(Alla temperatura ambiente di 40 °C e sovratemperatura di 30 °C. A parità di sezione, per conduttori in bronzo, corrente ammissibile > 0,9, in alluminio > 0,8, in lega di alluminio > 0,75 dei valori di tabella.)

Sezione (mm²)	Corrente (A)	
	aria stagnante	aria legg. mossa
10	55	85
16	75	110
25	105	145
40	145	195
63	200	265
100	280	355
160	390	470
250	540	640
400	750	870

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- □ collegamento all'indice della sezione o del capitolo dal quale il documento discende;
- ↓ collegamento al documento successivo nell'opera (all'interno di uno stesso capitolo);
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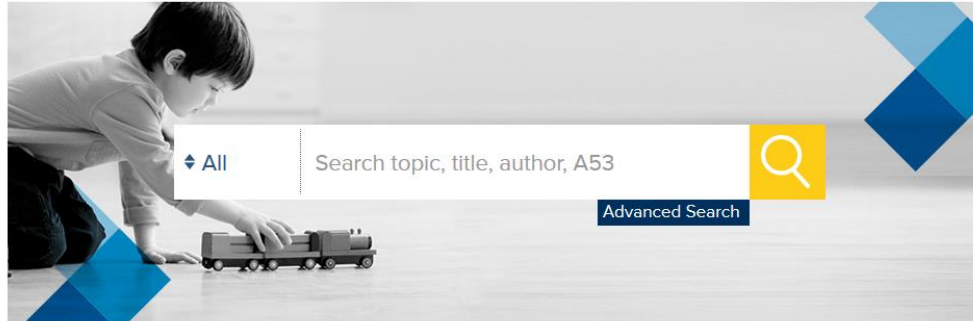


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American Society for Testing and Materials

- Costituita nel 1898, fondata da Charles B. Dudley, un chimico della Pennsylvania
- Nel 2001 cambia nome in ASTM International.
- E' un'organizzazione senza scopo di lucro che fornisce un forum per lo sviluppo e la pubblicazione di standard internazionali di consenso volontario per materiali, prodotti, sistemi e servizi
- I membri volontari, circa 30.000, rappresentano produttori, utenti consumatori, governi, Università di oltre 140 paesi. Appartengono a uno o più comitati di stesura degli standard, ognuno dei quali copre un'area tematica come acciaio, petrolio, dispositivi medici, prodotti di consumo, nanotecnologie e molti altri e sviluppano documenti tecnici che sono alla base della produzione, gestione, approvvigionamento, codici e regolamenti per decine di settori industriali.



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- Quality
- Safety and Security
- Services
- Sports and Leisure
- Textiles and Leather
- Transportation and Logistics



Portali tematici



Water: Standardization for an Essential Resource and Precious Commodity

Water is becoming a prominent topic in global settings as drought and population pressures increase the need for abundant sources of water. Water is considered to be one of the biggest resources and most important commodities in the 21st Century. Population pressures and rising demand combined with declining fresh water supplies is creating a tension and stress on communities and businesses worldwide. As the effects of climate change become clearer the changes in water rainfall patterns are exacerbating this increasingly challenging situation.

As defined by ASTM Committee D19 on Water, the term "water" includes, but is not limited to, surface waters (rivers, lakes, artificial impoundments, runoff, etc.), groundwaters and springwaters, wastewaters (mine drainage, landfill leachate, brines, waters resulting from atmospheric precipitation and condensation (with the exception of acid deposition), process waters, potable waters, glacial melt waters, steam, water for subsurface injection and water discharges including waterborne materials and water-formed deposits.

In an effort to continue to meet the expanding need for standardized practices and methods for water testing, transport, recycling, and safety, ASTM has compiled a listing of its current portfolio of standards related to Water.

Within the topic of Water as a Resource and Commodity, ASTM has identified five areas of interest.

To visit the ASTM Water Portal relevant to your interests, click on the links below.



Environmental Preservation, Stewardship and Sustainable Use of Water Source



Testing and Maintenance of Water Quality



Extraction, Transportation, and Infrastructure for Water



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- **Bulletins**
- **Materials Research and Standards** (dal 1961 al 1972): magazine ufficiale pubblicato mensilmente. Queste edizioni includevano notizie della Società, le sue attività, pubblicazioni del comitato tecnico, nonché documenti tecnici. Ogni edizione mensile contiene molti documenti tecnici individuali



Terminology dictionary

Strumento che consente di individuare i termini contenuti negli standard sviluppati dai comitati tecnici ASTM

Search

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A01 Steel, Stainless Steel and Related Alloys
A04 Iron Castings
A05 Metallic-Coated Iron and Steel Products
A06 Magnetic Properties
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DESIGNATION: D7510 - 10(2016)e1

Standard Practice for Performing Detection and Quantitation Estimation and Data Assessment Utilizing DQCALC Software, based on ASTM Practices D6091 and D6512 of Committee D19 on Water^{1, 2}

Active Standard ASTM D7510

ADD/EDIT ANNOTATION

This standard is issued under the fixed designation D7510; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (e) indicates an editorial change since the last revision or reapproval.

^{e1} NOTE—Reapproved with editorial change to 4.2.3 in December 2016.

In this standard:

- [Section 1 Scope](#)
- [Section 2 Referenced Documents](#)
- [Section 3 Terminology](#)
- [Section 4 Minimum Requirements](#)
- [Section 5 Basic Operation of DQCALC Software](#)
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ADD/EDIT ANNOTATION PRINT SECTION

1 | Scope

1.1 This software was developed to automate calculations within three ASTM standards: Practices D2777 (outlier removal section), D6091, and D6512.

1.2 The program calculates detection estimates (DE) and quantitation estimates (QE) for the constant, straight-line, exponential, and hybrid (Rocke-Lorenzato) models of the variation of [inter or intra] laboratory standard deviation (ILSD) with concentration. Calculations are shown in the DE_QE

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Annotare standard

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DESIGNATION: E2590 - 15

Standard Guide for Conducting Hazard Analysis-Critical Control Point (HACCP) Evaluations

Active Standard ASTM E2590

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PDF Pages: 30

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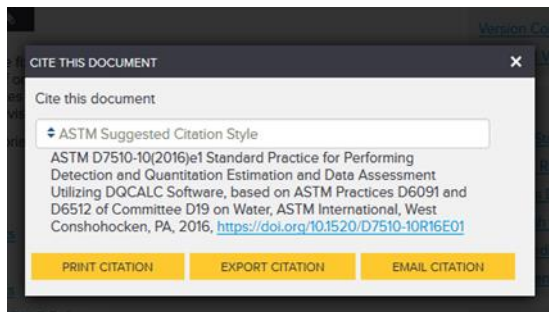
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Standard: ASTM D7510-10(2016)e1
Standard Practice for Performing Detection and Quantitation Estimation and Data Assessment Utilizing DQCALC Software, based on ASTM Practices D6091 and D6512 of Committee D19 on Water

Publisher: ASTM International
Issue: Dec 1, 2016
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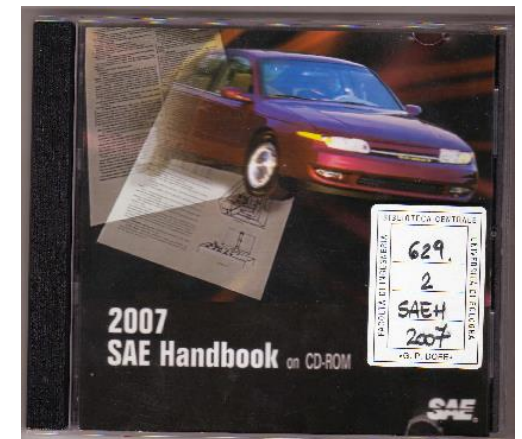
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☐ Methodology for Combustion Analysis of a Spark Ignition Engine Incorporating a Pre-Chamber Combustor

MAHLE Powertrain LLC - Michael Bunce, Hugh Blaxill

DOI: <https://doi.org/10.4271/2014-01-2603>

Published 2014-10-13 by SAE International in United States

Technical Paper
2014-01-2603

With an increasing global awareness of the need to conserve fuel resources and reduce carbon dioxide emissions, the automotive sector has been seeking gains in engine efficiency. One such method for achieving these gains on a spark ignition (SI) engine platform is through lean burn operation. Ultra-lean operation ($\lambda > 2$) has demonstrated the ability to increase thermal efficiency and significantly reduce emissions of nitrogen oxides (NO_x) due primarily to lower mean gas temperatures. Turbulent Jet Ignition (TJI), a pre-chamber-based combustion system, is a technology that enables ultra-lean operation. TJI is also an effective knock mitigation system due to the distributed nature of main chamber ignition, resulting in rapid burn rates.

☐ The Effects of Turbulent Jet Characteristics on Engine Performance Using a Pre-Chamber Combustor

MAHLE Powertrain LLC - Michael Bunce, Hugh Blaxill

Spectral Energies LLC - Waruna Kulatilaka, Naibo Jiang

DOI: <https://doi.org/10.4271/2014-01-1195>

Published 2014-04-01 by SAE International in United States

Technical Paper
2014-01-1195

Increasingly stringent US fuel economy regulation has emphasized the need for automotive engines to achieve greater levels of efficiency. Lean operation in spark ignition engines has demonstrated the ability to increase thermal efficiency, but this is typically accompanied by increased nitrogen oxides (NO_x) emissions. Ultra-lean operation ($\lambda > 2$), however, has demonstrated increased thermal efficiency and the potential for significant reductions in NO_x . Turbulent Jet Ignition (TJI) enables ultra-lean operation by utilizing radical turbulent jets emerging from a pre-chamber combustor as the ignition source for main chamber combustion in a spark ignition engine. This study seeks to better understand the interaction between the pre-chamber and main chamber combustion events, specifically the effect that particular TJI design parameters have on this interaction.

☐ A Computational Study of the Effects of Spark Location on the Performance of a Turbulent Jet Ignition System

Michigan State University - Bruce Charles Thelen, Elica Toulkon



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Overview of Diesel Engine Applications Design Characteristics of Different Appl

Navistar, Inc. - Qianfan (Harry) Xin

DOI: <https://doi.org/10.4271/2011-01-2180>

Published 2011-09-13 by SAE International in United States

This paper is the third part of a series of three papers on the differences in emissions, operation, and design applications that engine system design engineers must consider for land-based mobile off-road, locomotive, marine, and aircraft engine applications. The analysis technique of competitive benchmarking application data to reveal design trends. Two empirical performance and design parameters. A summary of applications is developed as a design guideline. Contents are also selected in the review portion.

Technical Paper 2011-01-2180

Dual Fuel Natural Gas/Diesel Engines: Technology, Performance, and Emissions

Engine, Fuel, and Emissions Engineering, Inc. - Christopher S. Weaver, Sean H. Turner

DOI: <https://doi.org/10.4271/940548>

Published 1994-03-01 by SAE International in United States

This paper summarizes a review of dual-fuel natural gas/diesel engine technology carried out for the Gas Research Institute (GRI) in the past. dual-fuel natural gas/diesel engines have been relegated to a few small niche markets, but our review has shown that dual-fuel engine technology has significant potential. Potential advantages of dual-fuel engines include diesel-like efficiency and brake mean effective pressure (BMEP) with much lower emissions of oxides of nitrogen (NOx) and particulate matter. New technologies offer solutions to the problems of poor efficiency and emissions at light load. Dual-fuel engines can be designed to operate interchangeably on natural gas with a diesel pilot, or on 100% diesel fuel. Many existing diesels can be converted to dual-fuel operation. Preliminary economic analyses show that such conversions could be justified from the fuel cost savings alone in applications such as railroad locomotives, marine vessels, mine trucks, and diesel power generation systems.

Technical Paper 940548



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1D Simulation and Experimental Analysis of a Turbocharger Compressor for Automotive Engines under Unsteady Flow Conditions

Fabio Bozza - *Universita' di Napoli*; Vincenzo De Bellis - *Universita' di Napoli*; Silvia Marelli - *Universita' di Genova*; Massimo Capobianco - *Universita' di Genova*

DOI: <https://doi.org/10.4271/2011-01-1147>
Published April 12, 2011 by SAE International in United States

Journal Article
2011-01-1147

Sector: Automotive
Topic: Simulation and modeling, Compressors, Turbochargers, Spark ignition engines
Event: SAE 2011 World Congress & Exhibition
Citation: Bozza, F., De Bellis, V., Marelli, S., and Capobianco, M., "1D Simulation and Experimental Analysis of a Turbocharger Compressor for Automotive Engines under Unsteady Flow Conditions," *SAE Int. J. Engines* 4(1):1365-1384, 2011, <https://doi.org/10.4271/2011-01-1147>.
Language: English

References

Cited By

1. Fabio Bozza, Vincenzo De Bellis, "Map-Based and 1D Simulation of a Turbocharger Compressor in Surging Operation", *SAE International Journal of Engines* 4:2418 , 2011
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2. V. Ravaglioli, N. Cavina, A. Cerofolini, E. Corti, D. Moro, F. Ponti, "Automotive Turbochargers Power Estimation Based on Speed Fluctuation Analysis", *Energy Procedia* 82:103 , 2015
[CrossRef](#)
3. Stephanie Stockar, Marcello Canova, Yann Guezennec, Augusto Della Torre, Gianluca Montenegro, Angelo Onorati, "Modeling wave action effects in internal combustion engine air path systems: comparison of numerical and system dynamics approaches", *International Journal of Engine Research* 14:391 , 2013
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4. Vincenzo De Bellis, Fabio Bozza, Marco Bevilacqua, Guido Bonamassa, Christof Schernus, "Validation of a 1D Compressor Model for



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☒ NUMERICAL PREDICTION OF VARIOUS FAILURE MODES IN SPOTWELDED STEEL MATERIAL

Wichita State University - Sachin Patil

Published 2018-06-22 by SAE

Journal Article 2018-01-9750

Crash simulation is targeted for structures. A modern car structure plays an important role for the automotive industry in order to introduce a proper method of the applied load range is beyond the yield strength. Three-dimensional finite element (FE) models of spot welded joints are developed using the LS-Dyna FE code. In this process the force estimation model of spot welds is explained. The results of this paper shows good agreement between the simulations and the tests. Therefore, spot weld model obtained from this study should be considered for applications in crash analysis.

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Published 2018-06-15 by SAE International in United States

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stemming from manufacturing can be a limiting factor for the quality and reliability of products. Assessments are increasingly being performed during the early stages of product development. Products are complex engineering systems, the development of which require multidisciplinary expertise. In such contexts, there are significant barriers against assessing the effects of geometrical variations on the function of products. To overcome these barriers, this paper introduces a new methodology consisting of a modelling approach based on a multidisciplinary simulation environment. The modelling approach is based on the parametric point method, which allows point-scanned data to be transferred to parameterised CAD models. In a case study, the methodology is implemented in an industrial setting. The capability of the methodology is demonstrated through a few applications, in

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Overview of Diesel Engine Applications for Engine System Design - Part 3: Operating and Design Characteristics of Different Applications

Navistar, Inc. - Qianfan (Harry) Xin
DOI: <https://doi.org/10.4271/2011-01-2180>
Published 2011-09-13 by SAE International in United States

Technical Paper
2011-01-2180

This paper is the third part of a series of three papers (parts) that address diesel engine applications. It provides an overview on the differences in emissions, operation, and design characteristics between eight categories of various diesel engine applications that engine system design engineers need to know, including on-road heavy-duty, on-road light-duty, land-based mobile off-road, locomotive, marine, stationary, alternative fuels and biodiesel, and two-stroke diesel engines. The analysis technique of competitive benchmarking mapping is introduced by using a large amount of production engine application data to reveal design trends. Two empirical formulae are developed for the relationship between engine performance and design parameters. A summary table of engine system design considerations and priorities for different applications is developed as a design guideline. Comprehensive references and bibliography on diesel engine applications are also selected in the review portion.

Dual Fuel Natural Gas/Diesel Engines: Technology, Performance, and Emissions

Engine, Fuel, and Emissions Engineering, Inc. - Christopher S. Weaver, Sean H. Turner
DOI: <https://doi.org/10.4271/940548>
Published 1994-03-01 by SAE International in United States

Technical Paper
940548

This paper summarizes a review of dual-fuel natural gas/diesel engine technology carried out for the Gas Research Institute.(1)* In the past, dual-fuel natural gas/diesel engines have been relegated to a few small niche markets, but our review has shown that dual-fuel engine technology has significant potential. Potential advantages of dual-fuel engines include diesel-like efficiency and brake mean effective pressure (BMEP) with much lower emissions of oxides of nitrogen (NOx) and particulate matter. New technologies offer solutions to the problems of poor efficiency and emissions at light load. Dual-fuel engines can be designed to operate interchangeably on natural gas with a diesel pilot, or on 100% diesel fuel. Many existing diesels can be converted to dual-fuel operation. Preliminary economic analyses show that such conversions could be justified from the fuel cost savings alone in applications such as railroad locomotives, marine vessels, mine trucks, and diesel power generation systems.

Engine Oil Performance and Engine Service Classification (Other than "Energy Conserving")

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An Efficient, Durable Vocational Truck Gasoline Engine

Thomas Reinhart and Marc Megel
Southwest Research Institute

Abstract

This paper describes the potential for the use of Dedicated EGR® (D-EGR®) in a gasoline powered medium truck engine. The project was possible to match the thermal efficiency of a medium-duty diesel engine in Class 4 to Class 7 truck operations. The project was for a D-EGR engine, including displacement, operating speed range, boosting systems, and BMEP levels. The engine simulation by experimental experience with smaller size D-EGR engines.

The resulting engine fuel consumption maps were applied to two vehicle models, which ran over a range of 8 duty cycles at 3 pi thorough evaluation of how D-EGR and conventional gasoline engines compare in fuel consumption and thermal efficiency to show that D-EGR gasoline engines can compete with medium duty diesel engines in terms of both thermal efficiency and GHG emissions. Since gasoline engines use less energy per gallon than diesel, the D-EGR engine will have higher fuel consumption in gallons than the diesel, but the higher price of diesel fuel for this difference in the US market.

D-EGR also results in much lower in-cylinder and exhaust temperatures, which will help improve durability compared to a conventional gasoline engine with its 3-way catalyst will be far cheaper than a diesel with DPF and SCR, so there is an opportunity for gasoline engines to regain market share.

CITATION: Reinhart, T. and Megel, M. "An Efficient, Durable Vocational Truck Gasoline Engine." *SAE Int. J. Engines* 9(3):1437-1448, 2016, <https://doi.org/10.4271/2016-01-0660>

Introduction

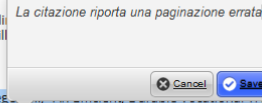
In a project for NHTSA, SwRI evaluated a range of potential fuel saving technologies for trucks ranging from Class 2b (3/4 ton pickups) to long haul tractor-trailer trucks [1, 2, 3, 4, 5]. Part of this project involved looking at both gasoline and diesel engine fuel saving technologies. One striking outcome was the efficiency potential for downsized and boosted gasoline engines using EGR. EGR allows gasoline engines to avoid or limit the timing retard that is normally required to avoid knock at low speed and high load. EGR also allows the engine to avoid the enrichment that is normally used to limit temperatures at high speed and load. A third benefit of EGR is reduced pumping work at light load. As a result, downsizing and boosting with the use of EGR leads to substantial improvements in gasoline engine brake thermal efficiency.

The results of the NHTSA project suggest that for a medium truck application, it should be possible to approximately match the thermal efficiency of a modern diesel engine using a boosted gasoline engine using D-EGR. The purpose of the project described in this paper was to explore the range of displacements, BMEP, and speed ranges that could be used, and determine the best parameter combinations for a gasoline D-EGR medium truck engine. SwRI has been working on D-EGR engines for several years. The work has been conducted using internal research funding, projects conducted by the HEDGE consortium (High Efficiency Dilute Gasoline Engine), and single client projects. A recent light duty passenger car D-EGR project is documented in [6].

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CITATION: Reinhart, T. and Megel, M. "An Efficient, Durable Vocational Truck Gasoline Engine." *SAE Int. J. Engines* 9(3):1437-1448, 2016, <https://doi.org/10.4271/2016-01-0660>



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Abstract

This paper describes the potential for the use of Dedicated EGR® (D-EGR®) in a gasoline powered medium truck engine. The project goal was to determine if it is possible to match the thermal efficiency of a medium-duty diesel engine in Class 4 to Class 7 truck operations. The project evaluated a range of parameters for a D-EGR engine, including displacement, operating speed range, boosting systems, and BMEP levels. The engine simulation was done in GT-POWER, guided by experimental experience with smaller size D-EGR engines.

The resulting engine fuel consumption maps were applied to two vehicle models, which ran over a range of 8 duty cycles at 3 payloads. This allowed a thorough evaluation of how D-EGR and conventional gasoline engines compare in fuel consumption and thermal efficiency to a diesel. The project results show that D-EGR gasoline engines can compete with medium duty diesel engines in terms of both thermal efficiency and GHG emissions. Since gasoline has less energy per gallon than diesel, the D-EGR engine will have higher fuel consumption in gallons than the diesel, but the higher price of diesel fuel makes up for this difference in the US market.

D-EGR also results in much lower in-cylinder and exhaust temperatures, which will help improve durability compared to a conventional gasoline engine. A D-EGR engine with its 3-way catalyst will be far cheaper than a diesel with DPF and SCR, so there is an opportunity for gasoline engines to regain medium truck market share.

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Introduction

In a project for NHTSA, SwRI evaluated a range of potential fuel saving technologies for trucks ranging from Class 2b (3/4 ton pickups) to long haul tractor-trailer trucks [1, 2, 3, 4, 5]. Part of this project involved looking at both gasoline and diesel engine fuel saving technologies. One striking outcome was the efficiency potential for downsized and boosted gasoline engines using EGR. EGR allows gasoline engines to avoid or limit the timing retard that is normally required to avoid knock at low speed and high load. EGR also allows the engine to avoid the enrichment that is normally used to limit temperatures at high speed and load. A third benefit of EGR is reduced pumping work at light load. As a result, downsizing and boosting with the use of EGR leads to substantial improvements in gasoline engine brake thermal efficiency.

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Historical Background

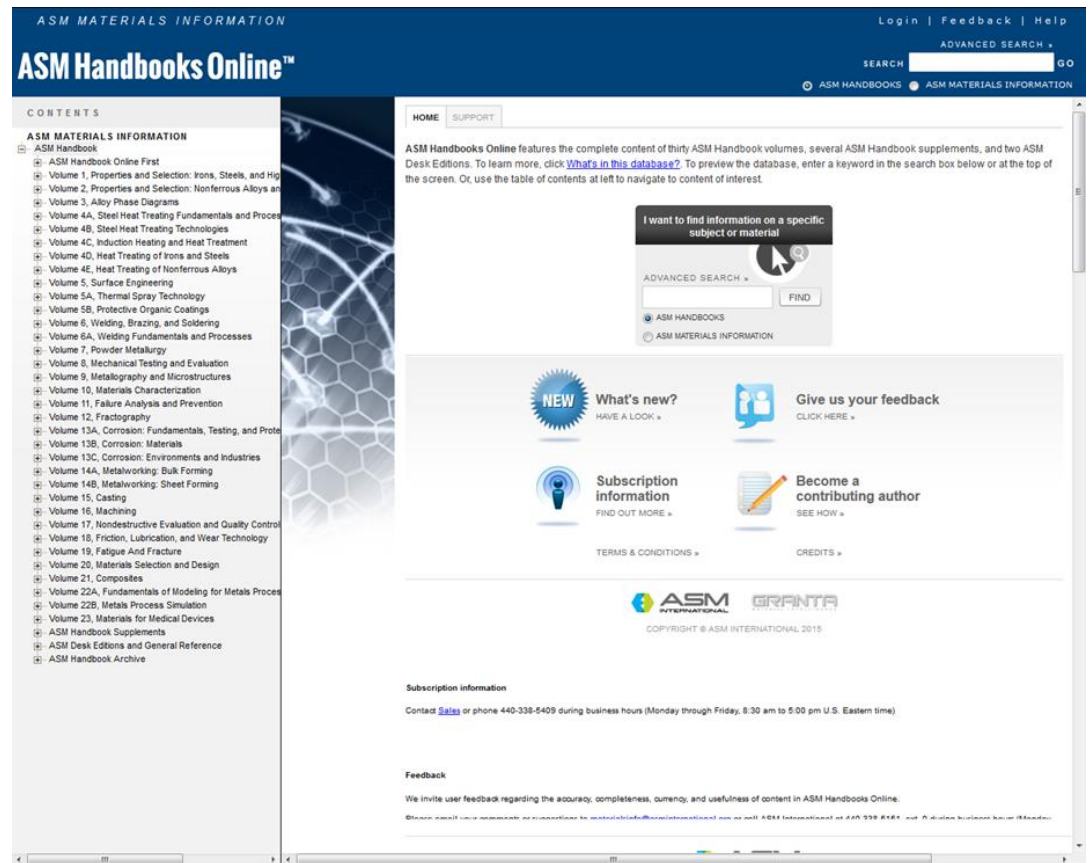
In the 1940s and 1950s, most medium- and heavy-duty trucks in North America were powered by gasoline engines. The same was true of off road equipment such as agricultural tractors and construction equipment. In the 1960s and 1970s, diesel engines took over the market for heavy duty trucks, and in the 1980s diesel engines went from a small share of vocational trucks to the dominant share. The factors driving the diesel takeover of the truck market were fuel

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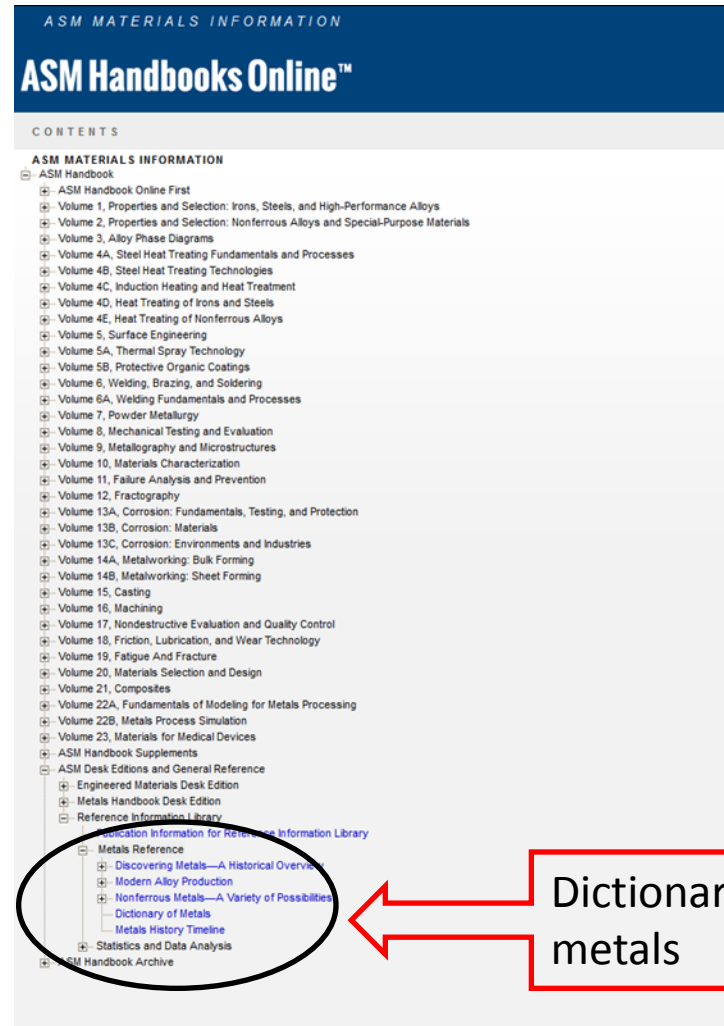
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