FACULTY OF ENGINEERING
AND ARCHITECTURE

SEARCHING, PROCESSING AND REVIEWING OF SCIENTIFIC LITERATURE

Introduction Master Thesis

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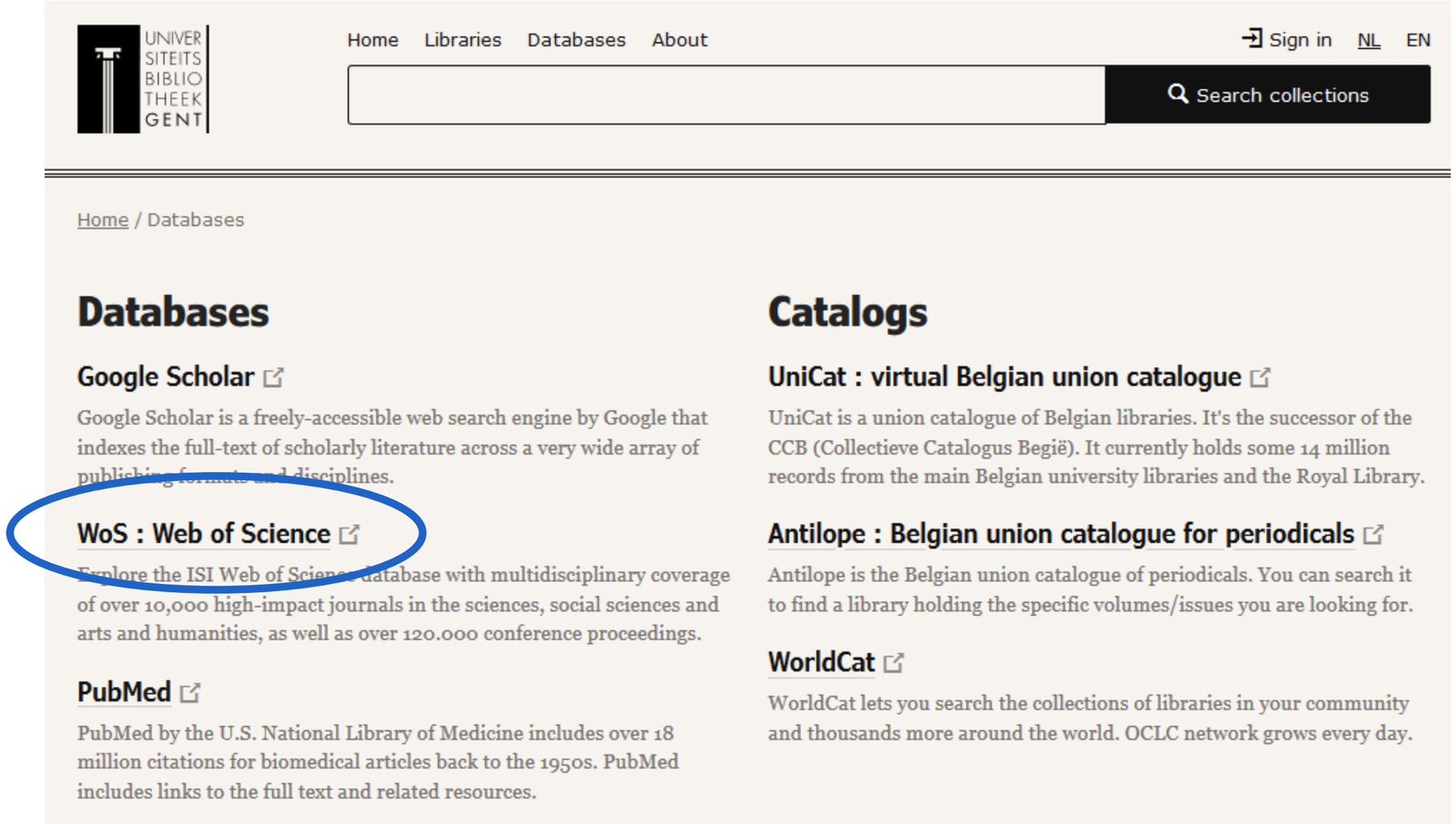

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T'Joen, C; De Paepe, M; (...); Willockx, A

ASME Heat Transfer Summer Conference

2005 | HT2005: Proceedings of the ASME Summer Heat Transfer Conference 2005, Vol 4 , pp.389-396

A fin-and-tube evaporator of a commercially available air conditioning unit was studied experimentally. To this end a test rig was constructed to measure the heat transfer capacity on the air and waterside of the evaporator. A wide range of Reynolds numbers on the air-side was investigated, focusing on the low Reynolds numbers, as modem air co ... Show more

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Billiet, M; Ameel, B; (...); De Paepe, M

Feb 2018 | INTERNATIONAL JOURNAL OF HEAT AND MASS TRANSFER 117 , pp.1304-1311

241 heat transfer measurements for R254fa were conducted. The heat transfer coefficient was determined for a smooth stainless steel tube with an inner tube diameter of 3 mm. The experiments were conducted for five mass fluxes (100, 300, 500, 700 and 1000 kg/(m(2) s)), three heat fluxes (10, 30 and 50 kW/m(2)) and at three saturation temperati ... Show more

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Flow regime based heat transfer correlation for R245fa in a 3 mm tube

Marijn Billiet (UGent) , Bernd Ameel (UGent) , Romain Charnay, Rémi Revellin and Michel De Paepe (UGent)

(2018) INTERNATIONAL JOURNAL OF HEAT AND MASS TRANSFER. 117. p.1304-1311

Author

Marijn Billiet (UGent) , Bernd Ameel (UGent) , Romain Charnay, Rémi Revellin and Michel De Paepe (UGent)

Organization

Department of Flow, heat and combustion mechanics

Abstract

241 heat transfer measurements for R254fa were conducted. The heat transfer coefficient was determined for a smooth stainless steel tube with an inner tube diameter of 3 mm. The experiments were conducted for five mass fluxes (100, 300, 500, 700 and 1000 kg/(m2 s)), three heat fluxes (10, 30 and 50 kW/m2) and at three saturation temperatures (40 °C, 70 °C and 125 °C). The experiments were used to determine the influence of the saturation temperature, mass flux, heat flux, vapour quality and flow regime on the heat transfer coefficient. At a low saturation temperature, the heat transfer coefficient increases with an increasing mass flux. However, at a high saturation temperature the heat transfer coefficient decreases with an increasing mass flux. Furthermore, the heat transfer coefficient increases with increasing vapour quality at a low saturation temperature. On the contrary, the heat transfer coefficient decreases at higher saturation temperatures. Due to the fact that most heat transfer models found in literature are developed for low saturation temperatures and one flow regime, the heat transfer coefficients predicted by the existing models do not comply very well with the experimental data. Thus, a new heat transfer correlation for R254fa was proposed. The new correlation has a Mean Absolute Error of 11.7% for the experimental data of a tube with an inner tube diameter of 3 mm. Finally, this new correlation was also verified with R245fa datasets of other authors.

Keywords

two-phase, refrigerant, heat transfer measurement

Subject

Technology and Engineering

Year

2018

Publication type

Journal Article (Original Article)

Publication status

published

Journal title

INTERNATIONAL JOURNAL OF HEAT AND MASS TRANSFER

Int. J. Heat Mass Transf.

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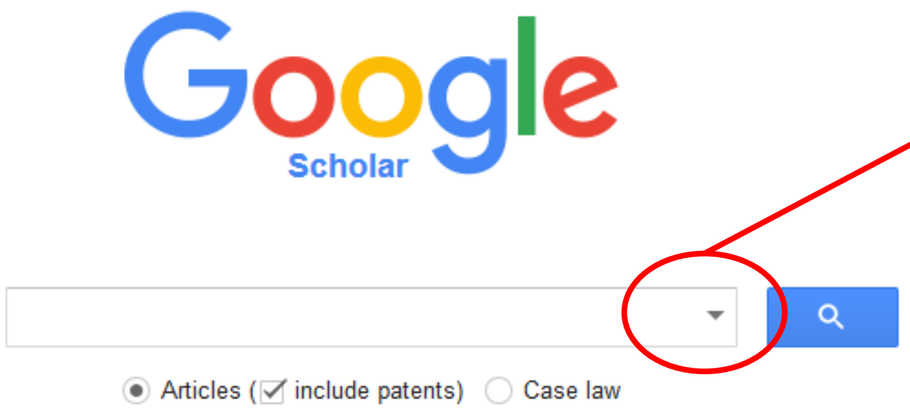

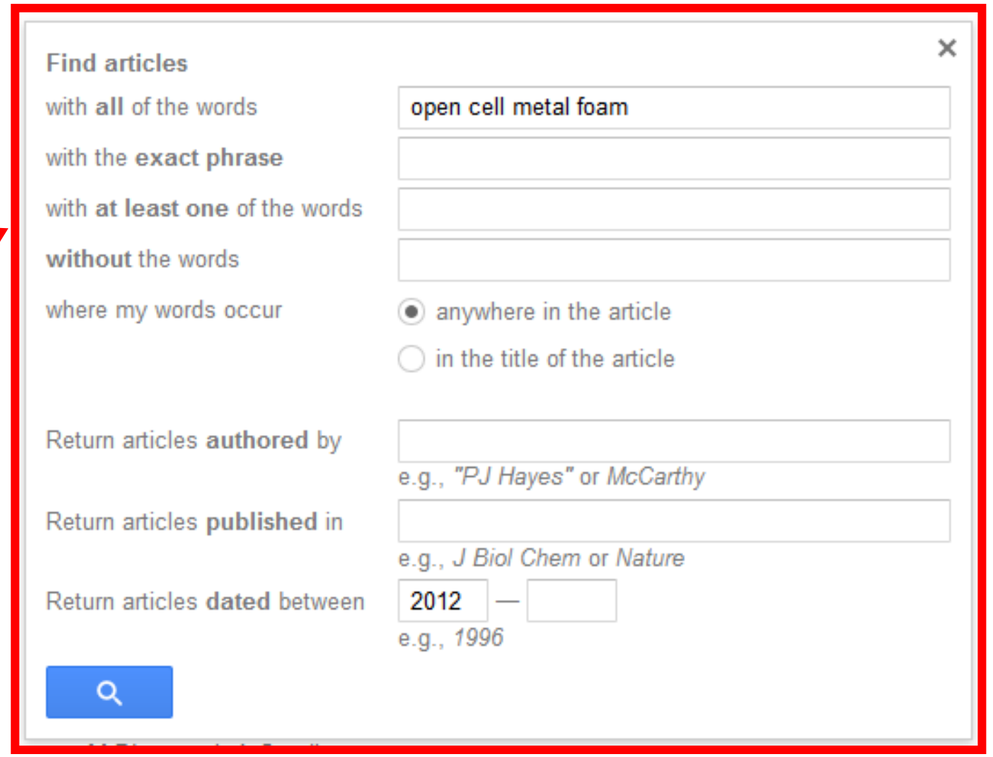

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Strong wall and transverse size effects on pressure drop of flow through **open-cell metal foam**
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N Dukhan, Ö Bağcı, LA Kavurmacıoğlu - Experimental Thermal and Fluid ..., 2015 - Elsevier
Abstract Heat transfer due to oscillating water flow in **open-cell** aluminum-**foam** pipe subjected to constant wall heat flux was investigated experimentally. The **foam** had 20 pores per inch and a porosity of 87.6%. Three flow displacements 1.5, 1.9 and 2.2 pipe ...
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Abstract A porous **metal** was suggested to be used for the anode of a DCFC. Thermo-fluidic characteristics of fuel-electrolyte mixture in the porous **metal** should be known in order for proper design of the anode. Previous researchers investigated pressure drop and heat ...
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Thermal development in **open-cell metal foam**: An experiment with constant wall heat flux
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Buoyancy driven convection in **open-cell metal foam** using the volume averaging theory
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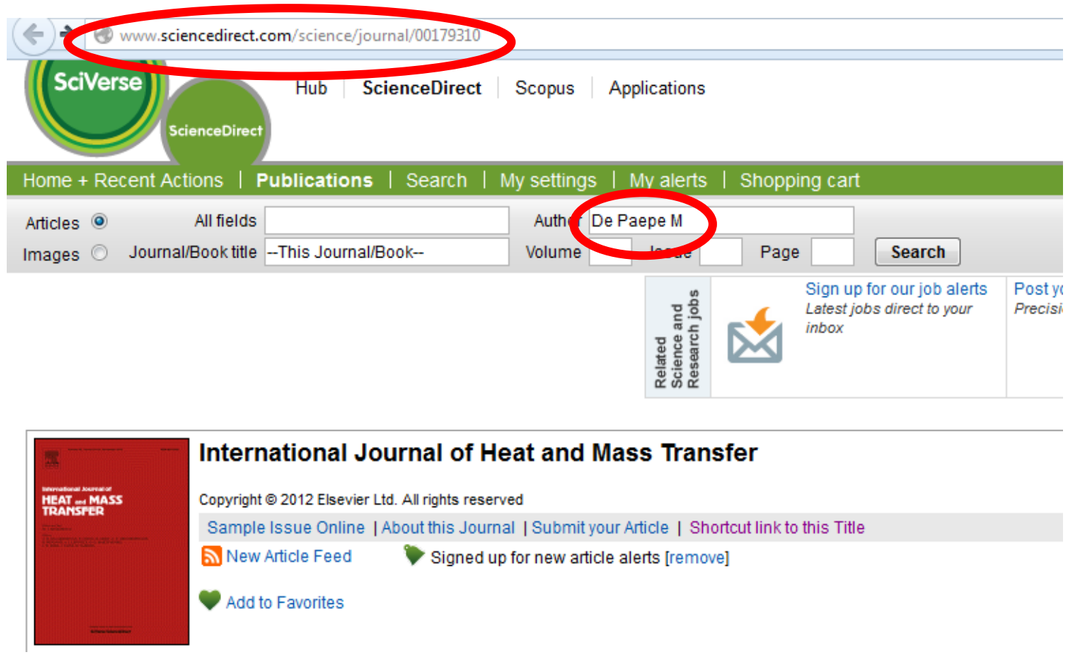

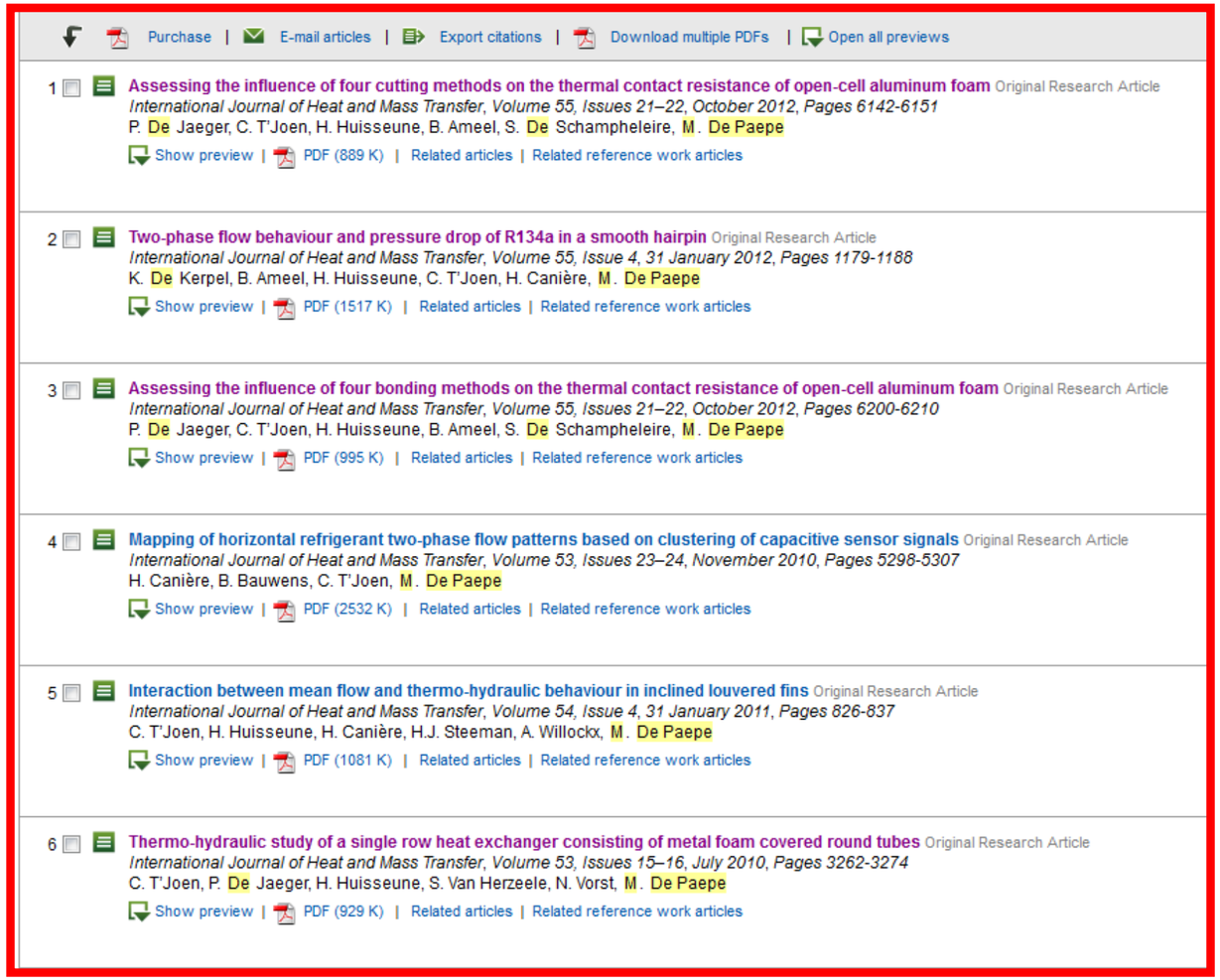

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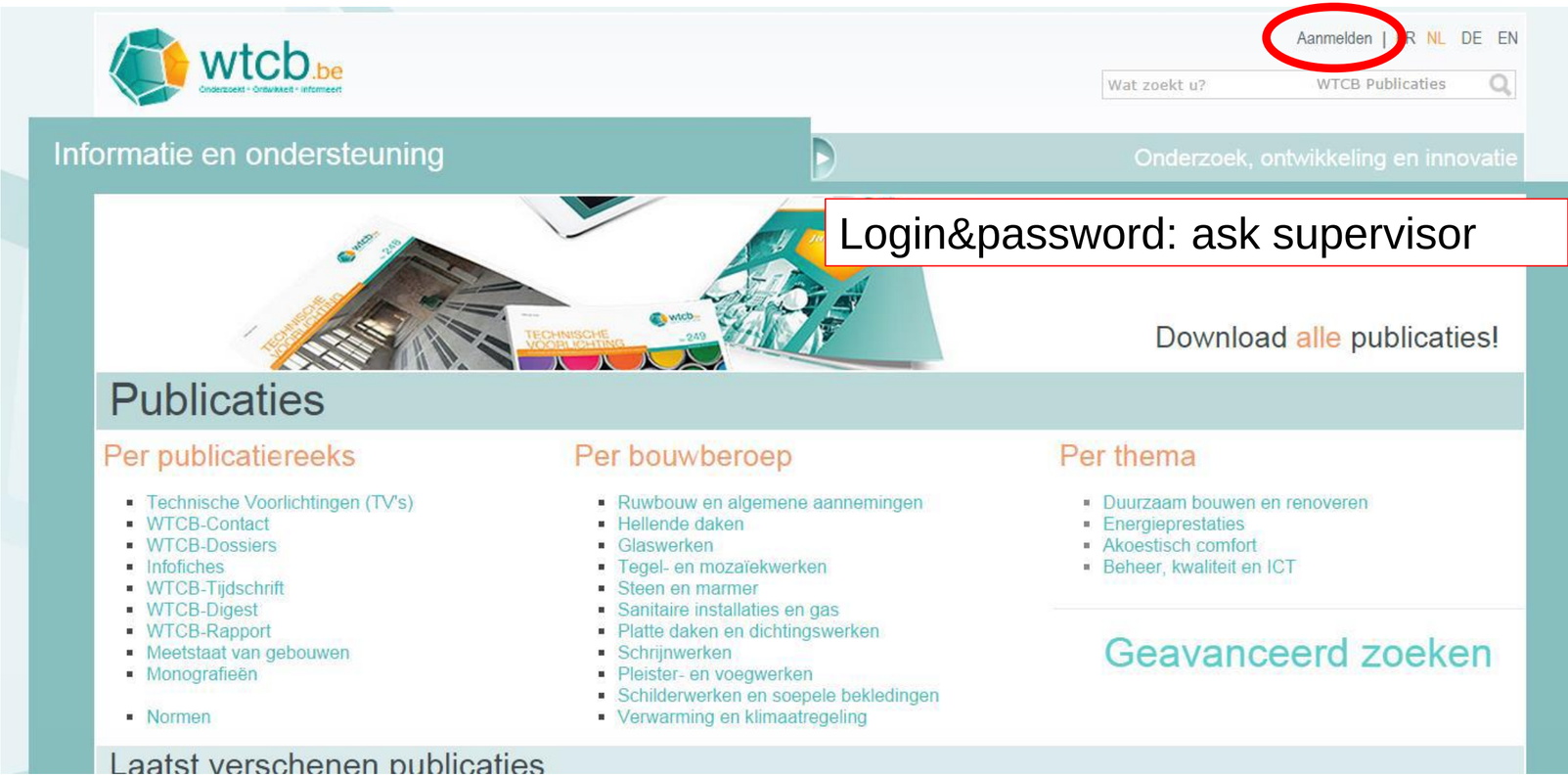

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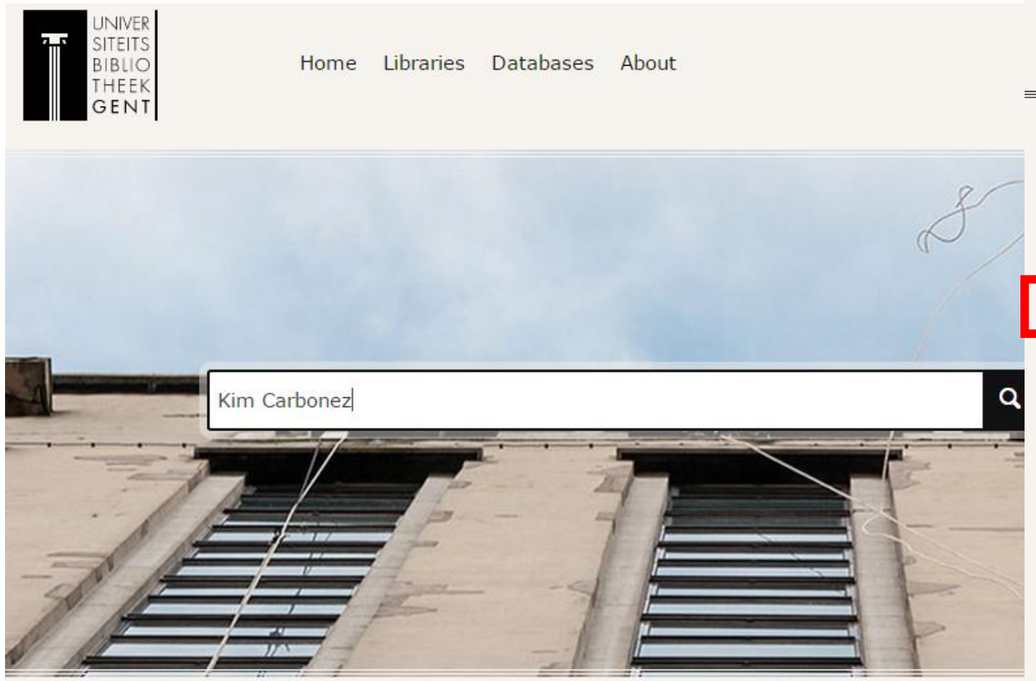

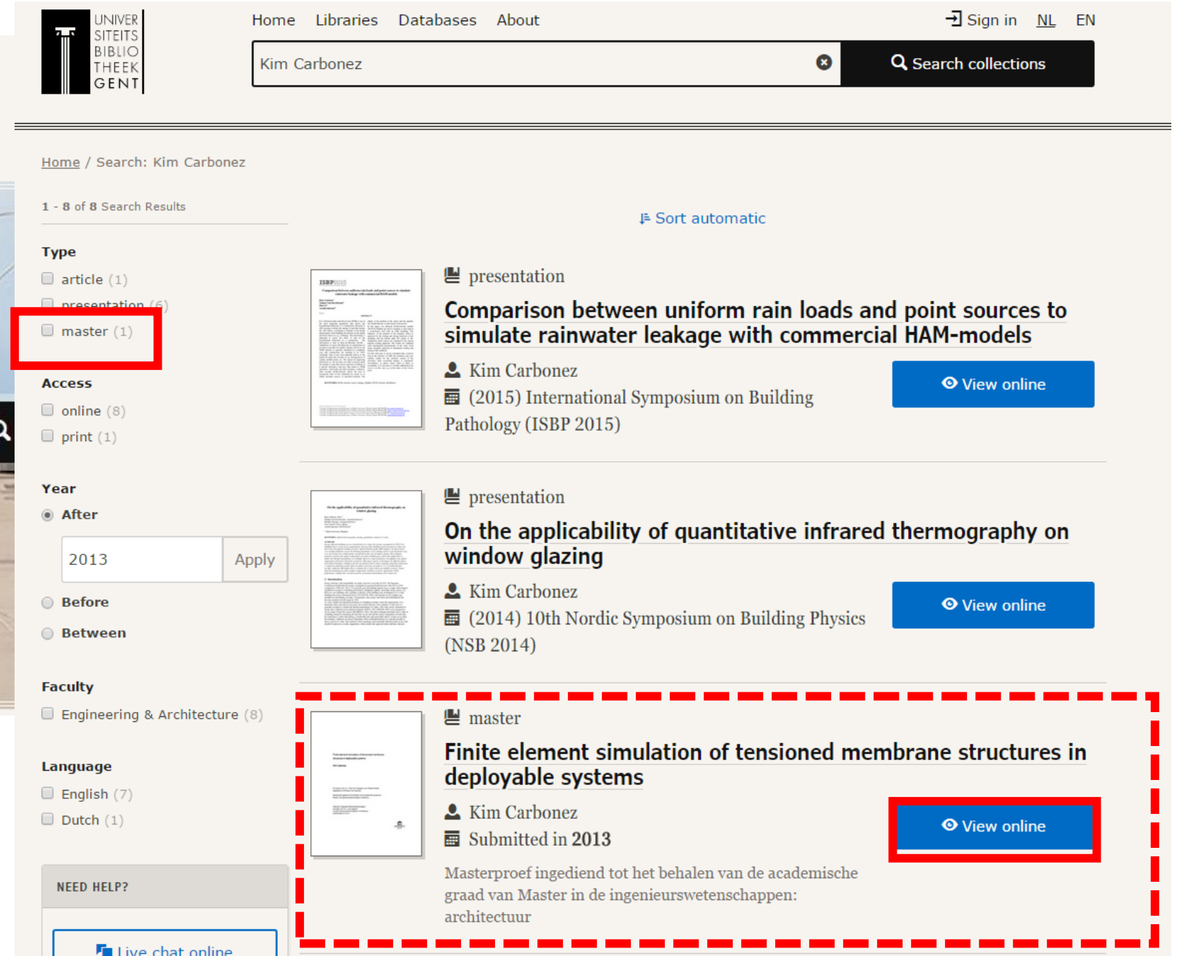

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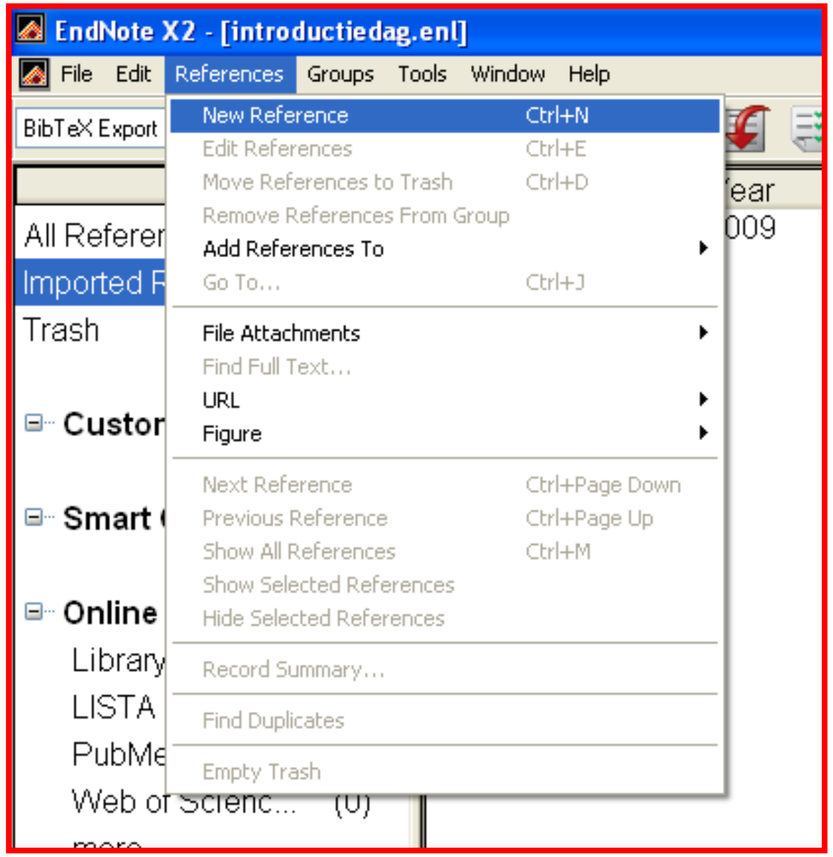

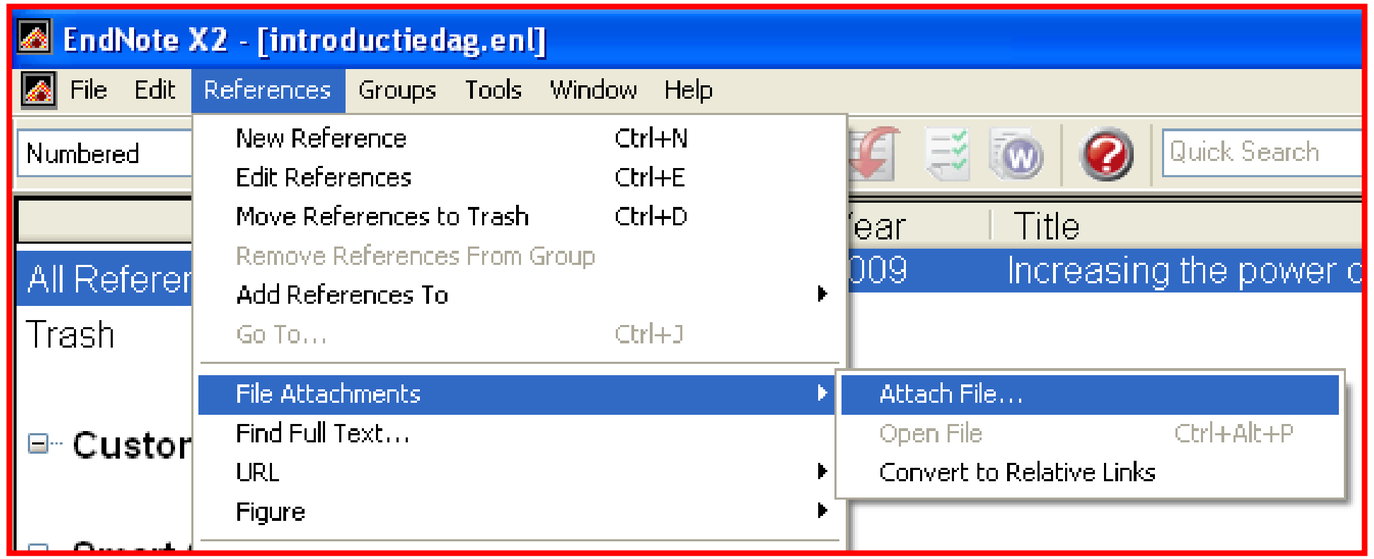

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Harvard Vesenjak, M., Veyhl, C. and Fiedler, T., 2012. Analysis of anisotropy and strain rate sensitivity of open-cell metal foam. *Materials Science and Engineering: A*, *541*, pp.105-109.

Vancouver Vesenjak M, Veyhl C, Fiedler T. Analysis of anisotropy and strain rate sensitivity of open-cell metal foam. Materials Science and Engineering: A. 2012 Apr 15;541:105-9.

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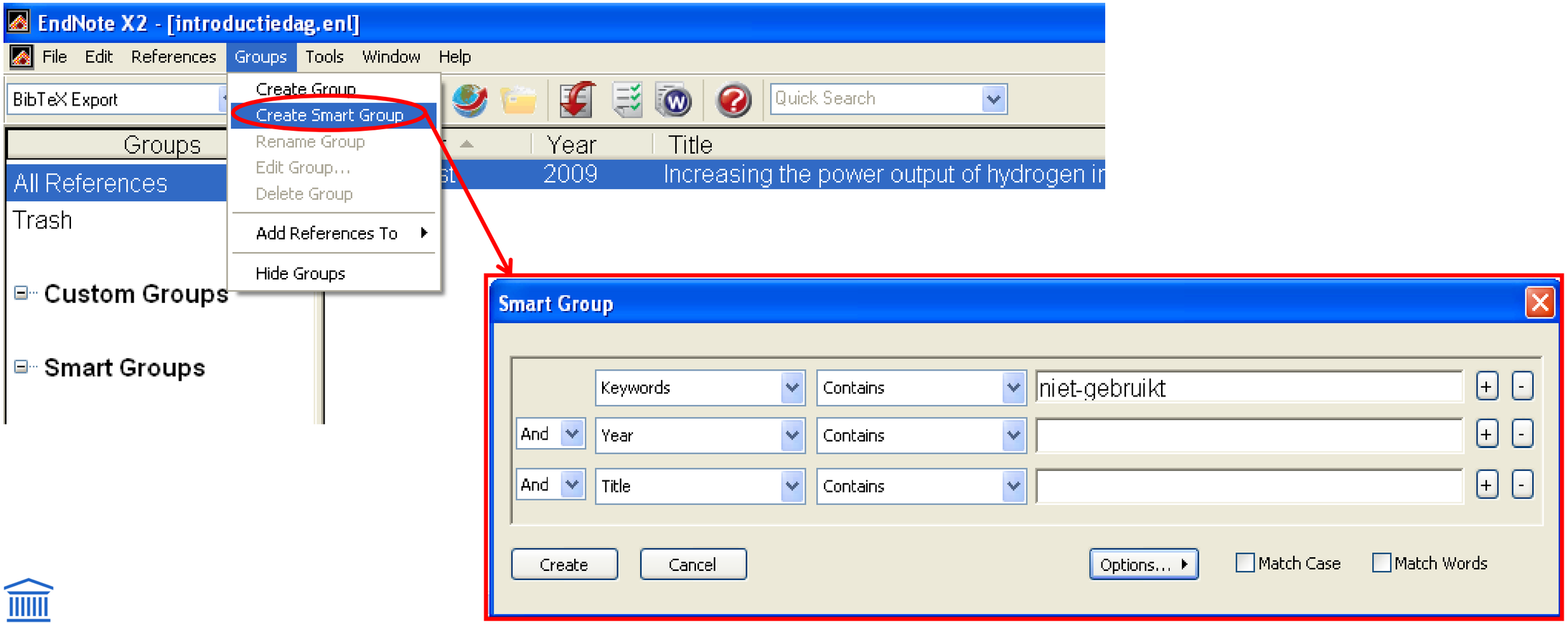

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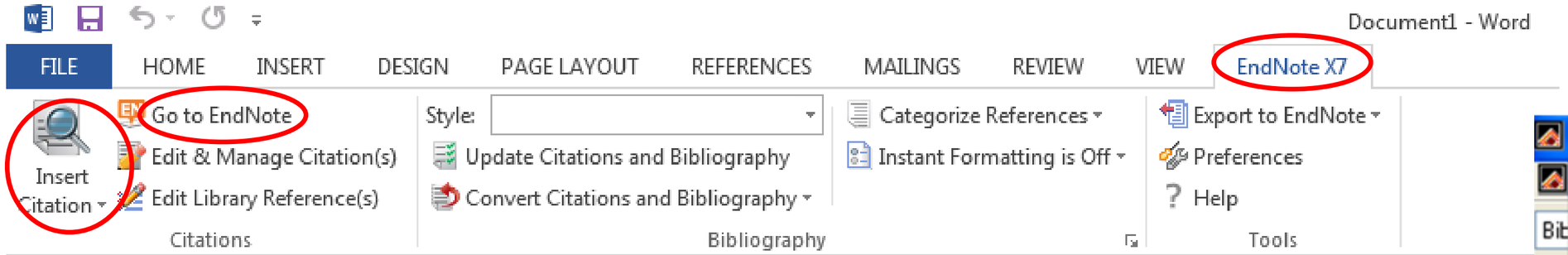

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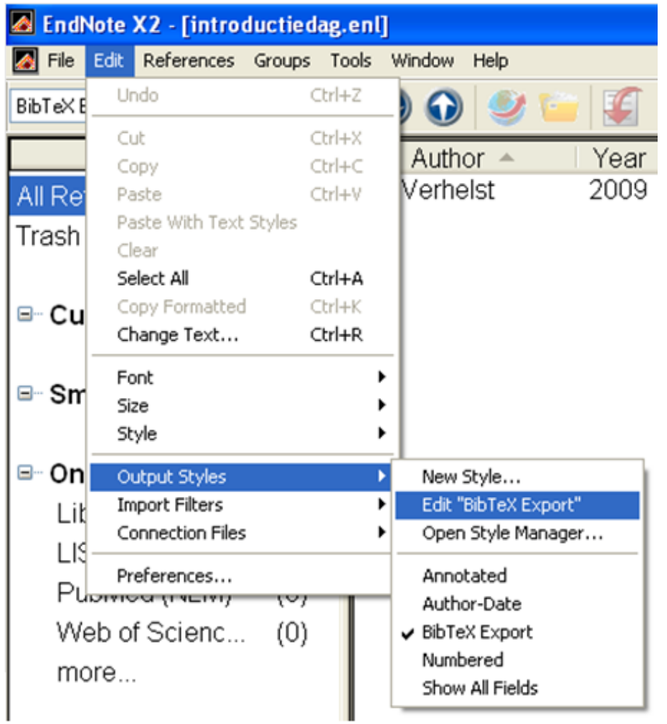

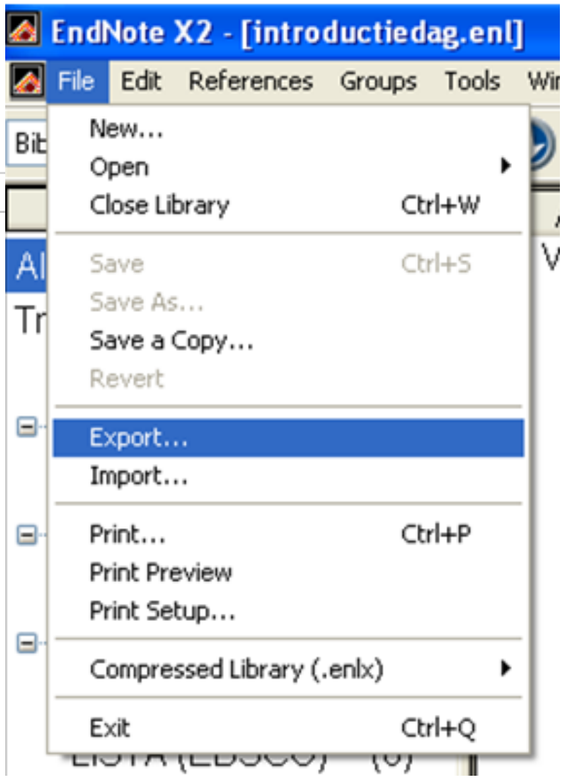

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3) YOUR LITERATURE STUDY

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HOW TO WRITE A GOOD INTRODUCTION AND LITERATURE SURVEY? (1)

- **Start** by introducing the broad context of the thesis
  - Not too broad ("in the beginning, there was nothing…")
  - Think about reader: e.g. external jury member (= not directly working on your topic)
- **Finish** by giving the problem and goal statement
- Your survey (for yourself!) should answer **3 questions**:
  - What is already known?
  - What can I use directly to solve my problem?
  - Where are the results contradictory / Where is knowledge still lacking?
- The final *review* is **not** a summary of every paper you have read, but rather a synthesis of the current 'state of the art' concerning your research topic
  - The summary is still useful for yourself, as a first step

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HOW TO WRITE A GOOD INTRODUCTION AND LITERATURE SURVEY? (2)

- At the conclusion of your survey you can state what the specific **goal** of your thesis is, e.g.:
  - Applying the available knowledge to a specific (new) problem
  - Gathering new fundamental knowledge by investigating the identified issues in the literature survey
- **Don't try to be exhaustive**
  - Avoid recitation, but stress the differences-similarities
  - Ask yourself if the reader really needs the information to understand your story/follow your statement
- Try to write an 'easy' to follow story
  - E.g. "tell tell tell" technique:
    - What are you going to tell (intro)
    - Tell them (body)
    - What did you just tell (wrap-up, link to next section)

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BAD EXAMPLE

Engine tests using *Chlorella vulgaris sp.* are reported by Makarevicieneé et al. [33]. The algae oil used for biodiesel production contained 7.6% of saturated fatty acids, 64.9% of unsaturated and 27.5% of polyunsaturated fatty acids. A two-step transesterification procedure was performed in a laboratory reactor for biodiesel production. Fuel mixtures containing 30% (v/v) biodiesel fuel (rapeseed oil methyl esters or microalgae oil methyl esters) and 70% (v/v) diesel fuel were used. The tests were performed in a diesel generator onboard a ship. The engine runs on a wide range of fuels, including pure biodiesel. As a result, when running each engine load with 30% (B30) of biodiesel, the brake-specific fuel consumption was approximately 3-3.5% higher than that with diesel fuel. When the engine ran on B30, the stoichiometric constant decreased by 3-3.5%, from 14.24 *kg* air/*kg* fuel for diesel to 13.7- 13.83 *kg* air/*kg* fuel (B30). In a comparison with rapeseed oil biodiesel, the authors found no significant differences. Concerning the exhaust emissions, the conversion of a Valmet 320 DMG engine from running on diesel to running on B30 from algae reduced hydrocarbons by approximately 10% compared to B30 from rapeseed oil. When running on B30 from algae, the engine's thermal efficiency was 2.5-3% higher compared to diesel fuel. The main effect of the improvements made to the environmental indicators was related to the reduction of the smoke by 10-75% and the reduction of HC emissions by 5-25% compared to diesel fuel.

Another report was presented by Haik et al. [34]. The engine used was a Ricardo E6 single cylinder variable compression indirect injection diesel engine. The studied algae species were *Ankistrodesmus braunii* and *Nannochloropsis sp*. The combustion pressure was measured by a water-cooled piezo-electric pressure transducer. The study was carried out to cover different types of fuels (base diesel fuel, algae oil methyl ester, algae oil methyl ester blended with diesel at 50/50 ratio and raw algae oil). For each fuel the engine parameters were varied according to the following levels: engine speed between 1080-1800 *rpm*, engine injection between 20-45° before top dead center (BTDC), load output torque from 2-18 *Nm* and compression ratio varied from 18 to 22. Biodiesel exhibits the highest combustion pressure rise rate compared to raw algae oil and diesel fuel but also higher ignition delay. The methyl esters exhibited more combustion noise compared to the diesel fuel or raw algae oil. Biodiesel produced less engine torque output than the diesel case and raw algae oil and slightly higher heat release rate compared to diesel fuel. The authors found a non-direct correlation between engines performance and the amount of methanol used in the chemical process for biodiesel production.

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1 paragraph per paper

Basically summarizing paper

What's the added value?

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GOOD EXAMPLE

J. Vancoillie et al. / Applied Energy 102 (2013) 140–149

“The elevated flame speed and wide flammability limits of alcohols open some alternative options for load control, especially for methanol. Pannone and Johnson [12] have published results from an experimental turbocharged lean-burn methanol engine. The reported brake thermal efficiencies are up to 14% better than for stoichiometrically fuelled engines with throttled load control [15]. Engine-out CO emissions were reduced by over 50%, while unburned fuel emissions mildly increased. The tailpipe NOx penalty of the lean burn strategy reached up to 150%, making the practical use of such a strategy questionable.”

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Highlighting what’s important for your problem/goal statement, comparing to other results (= new information)

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GOOD EXAMPLE

J. Vancoillie et al. / Applied Energy 102 (2013) 140–149

“The elevated flame speed and wide flammability limits of alcohols open some alternative options for load control, especially for methanol. Pannone and Johnson [12] have published results from an experimental turbocharged lean-burn methanol engine. The reported brake thermal efficiencies are up to 14% better than for stoichiome

Giving your own judgment / adding implications

Engine-out CO emissions

emissions mildly increased. The tailpipe NOx penalty of the lean burn strategy reached up to 150%, making the practical use of such a strategy questionable.”

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A TOOL: “CARS”

CARS – ”Creating A Research Space”

- A tool for writing an introduction that works*
  - Move I: Establishing a research territory
  - Move II: Establishing a research niche
  - Move III: Occupying the niche

* Swales, JM and Feak, CB, Academic writing for graduate students, 2nd Ed. Ann Arbor: University of Michigan Press (2004)

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ESTABLISHING A RESEARCH **TERRITORY**

- Show that the general research area is important, central, interesting, problematic, or relevant in some way:
  - *”In light-duty (LD) diesel engines, combustion noise levels need to be mitigated to fulfill customer expectations and legal requirements...”*
- Introduce and review items of previous research in the area:
  - *”Some early studies used a pilot injection dwell of around 50 CAD, which is very large by modern standards…”*

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ESTABLISHING A RESEARCH **NICHE**

- Indicate a gap in the previous research, or a need to extend previous knowledge in some way
  - *”While the effects of single pilot dwell spacing have been studied, there is a gap in research regarding multiple closely-coupled pilot injections which still feature a distinct main injection…”*

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OCCUPYING THE NICHE

- Outline the purpose of your study
  - *”This work is an investigation into what implications these closely-coupled triple-pilot strategies have on the heat release process…”*
- List research questions or hypotheses
  - *”The hypothesis is that the heat release rate is the factor controlling the combustion noise…”*
- Announce principal findings
  - *”It was found that the frequency of the HRR peaks determines the strongest noise frequencies.”*

OTHER APPROACH

1. Motivation
2. Research problem
3. Research question

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OTHER APPROACH

1. Motivation
   - Tell the reader why your research problem is important or interesting. E.g.:
     - *“We must limit combustion noise from light-duty diesel engines to fulfill customer expectations and future legal requirements – if we don’t, the diesel engine is dead.”*
     - *”PPCI yields low PM and NO_x emissions, but due to the high levels of EGR, the UHC emissions are usually high. This could be a showstopper for this promising technology.”*

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OTHER APPROACH

2. Research problem

- The research you present addresses a research problem. To motivate your research, you must establish this problem for the reader!

- It is usually a ”knowledge gap” – something that is not known
  - Tell us how others have studied your problem area
  - Establish the gap by telling us what they didn’t study
  - This helps us understand why you study it now…

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OTHER APPROACH

3. Research question

Formulate the question/hypothesis/goal. (It doesn't have to be formulated as a question.) What drives your specific experiment/study? For example:

- *"The hypothesis is that the shape of the heat release rate determines the combustion noise of the engine"*
- *"I will present in-cylinder PLIF distributions of UHC obtained under typical PPCI conditions to clarify the sources of UHC emissions in PPCI combustion systems"*

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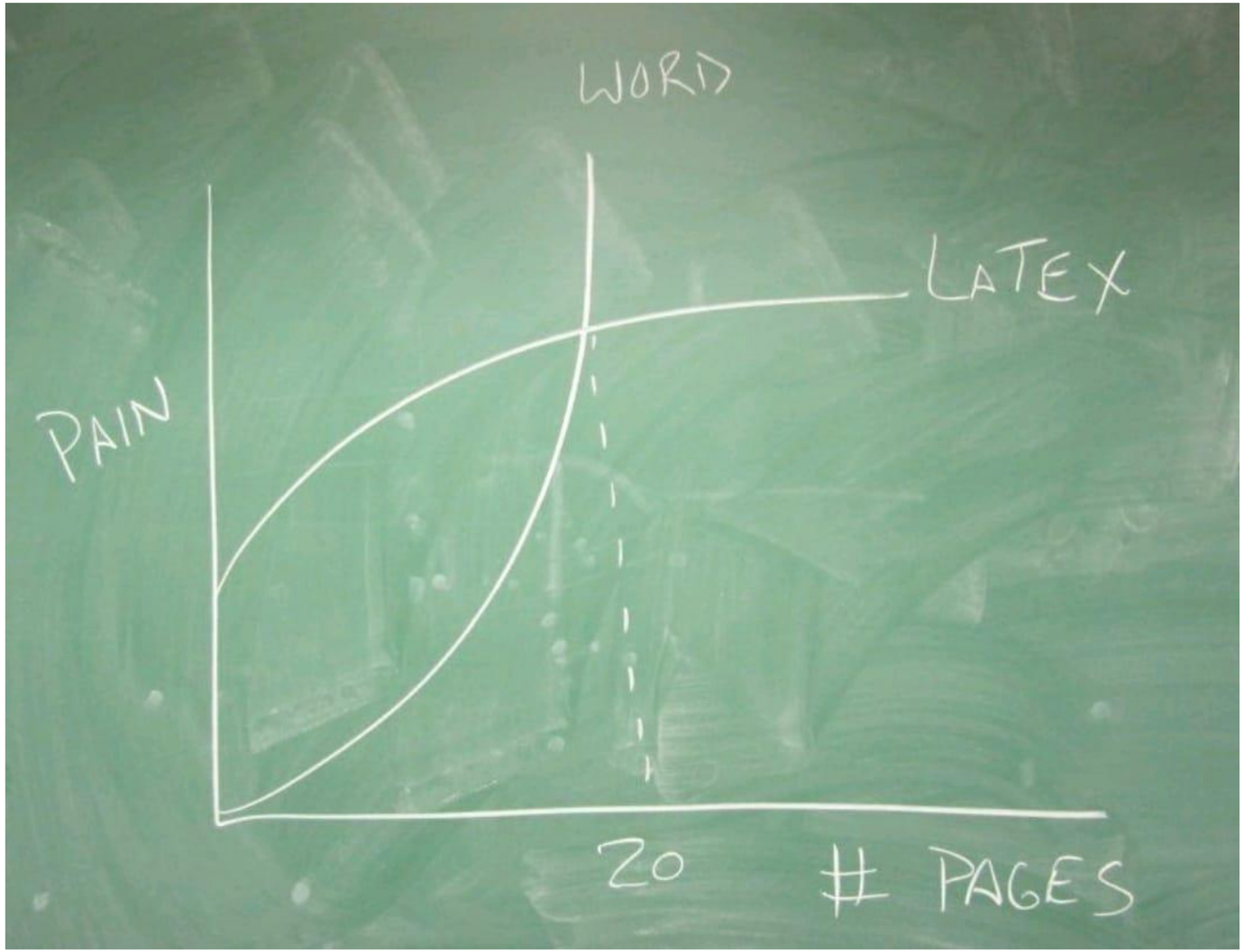
WORD PROCESSOR



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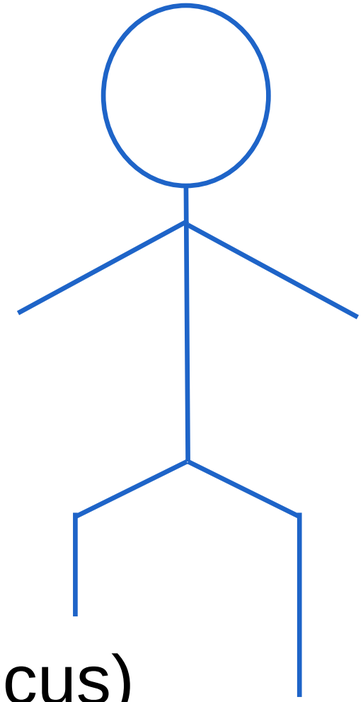
FINAL NOTE: OUR EXPECTATIONS



- Supervisors may contact you concerning different focus
  - Extensive literature review, or most recent findings combined with initial experimental results, ...
- 19 Nov: “strawman draft” of literature study
  - 1 or 2 pages: covering sections and storyline
  - You get feedback within a day if we spot issues (e.g. wrong focus)
- 3 Dec: full version
  - You get feedback before Xmas
  - Depending on number of comments, we might ask for a reworked version by 2nd semester
- This is intended for you to get started reading asap, and writing asap – these things need practice! Getting feedback increases your learning.

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STILL QUESTIONS?

- Go to https://www.ugent.be/ea/eemmecs/en/education/stfes/master-thesis

- Ask your supervisor
  - Preferably not: “How should I do this?”,
    but rather: “Would *this* be the best approach?”

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