

WPI

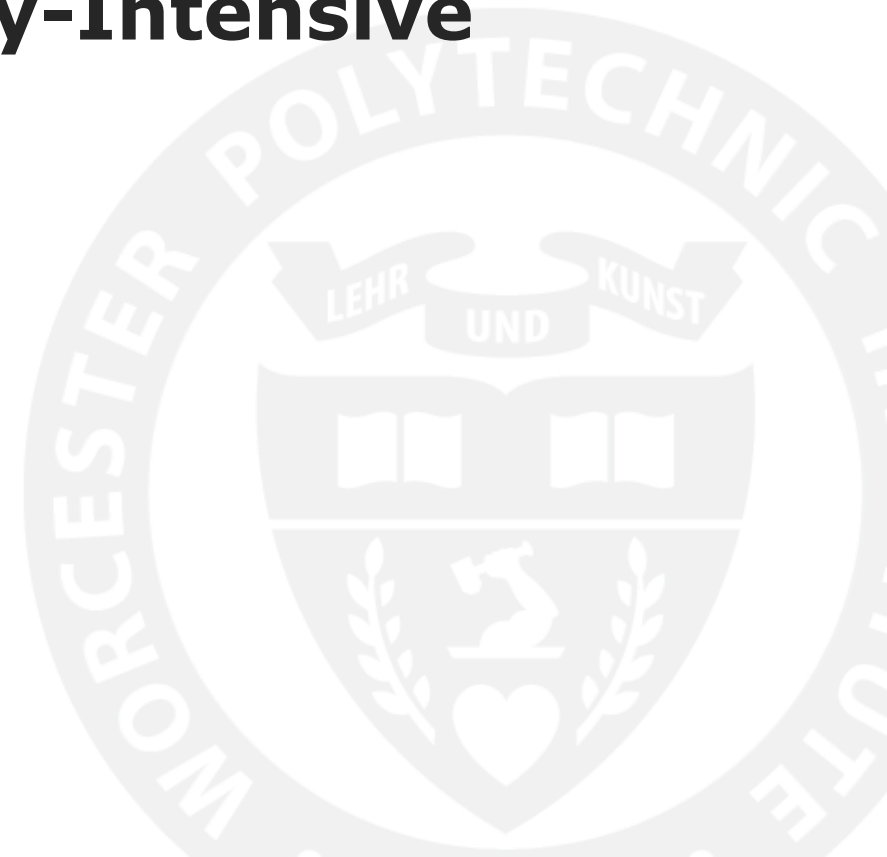
Reducing Carbon Footprint of Energy-Intensive Industrial Drying by Smart Dryers

Presenter: M. Elif ASAR S.; PhD Student

Advisor: Prof. Jamal YAGOOBI

Mechanical Engineering Department

13rd Annual WPI Sustainability Project Competition (2021)



Drying



https://unsplash.com/@rocinante_11



Energy-Intensive Industrial Drying

Paper



Food

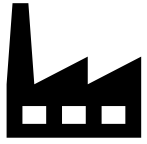


Pharmaceutical

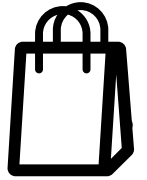


Impact

Are you aware how manufacturing a piece of paper impacts environment?



paper manufacturing takes up a quarter of the industrial energy used in the United States



70% of the energy used in papermaking is for drying paper.

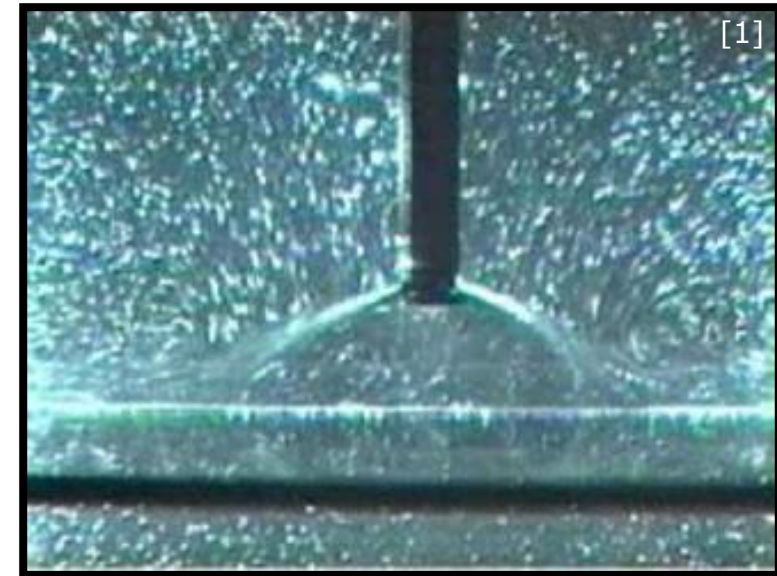
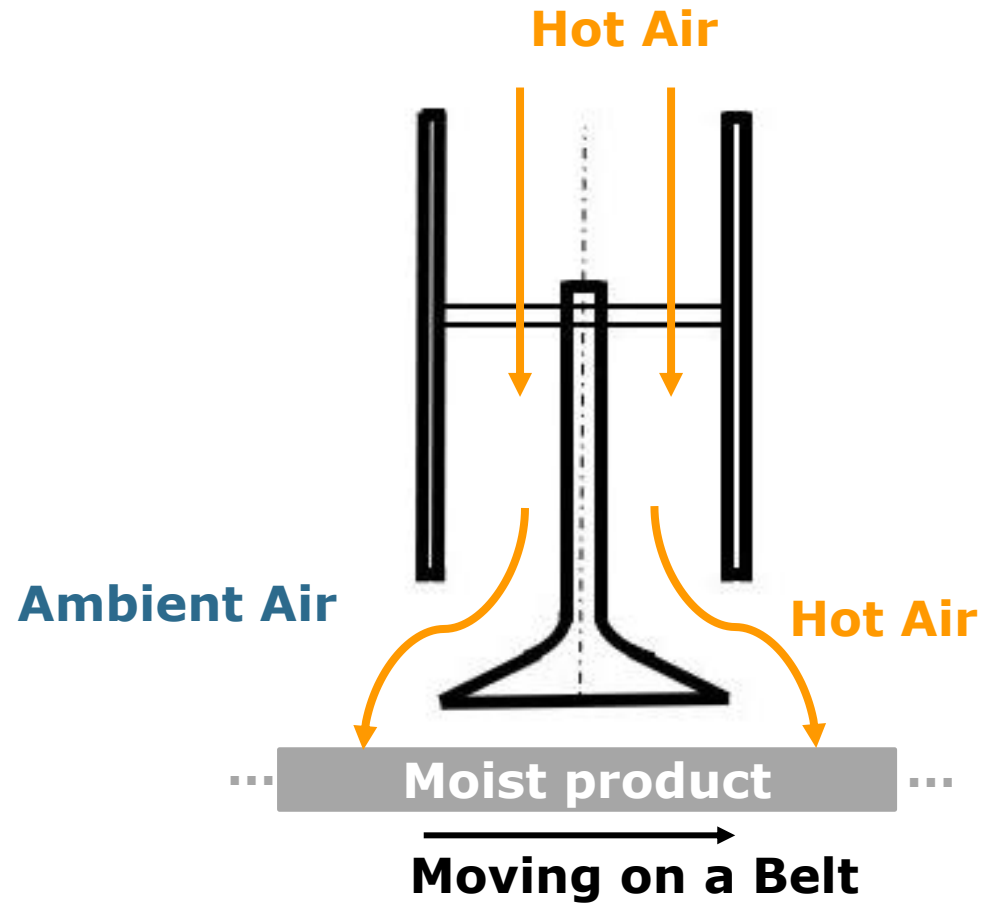


Every day, around 2000 tonnes of carbon dioxide is released just to dry paper.

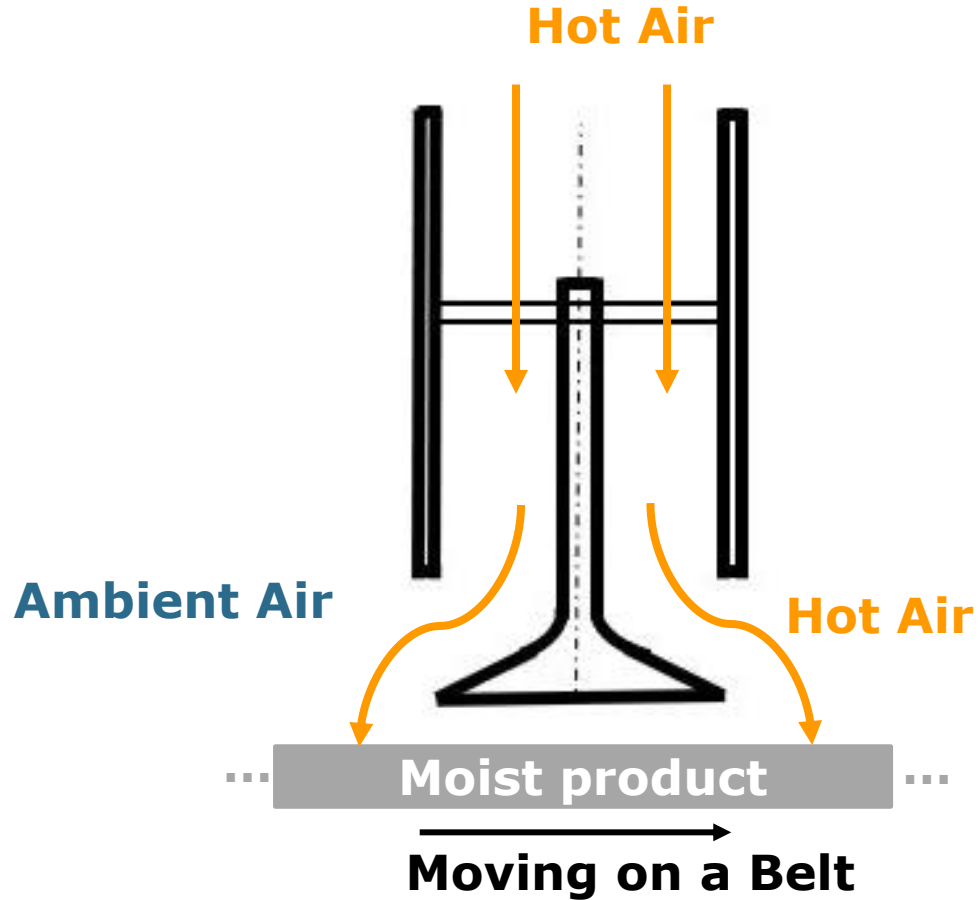


To capture the emission for one day, you must grow 100,000 trees for 10 years

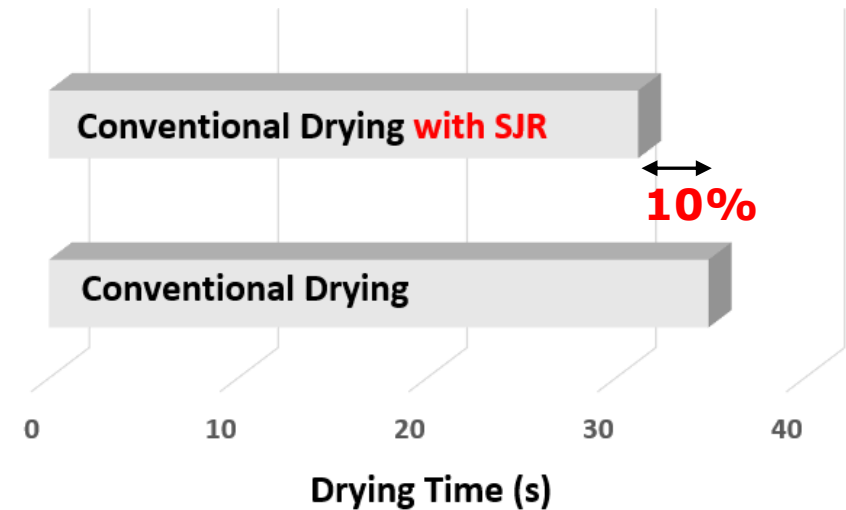
Slot Jet Reattachment (SJR) Nozzle



Results and Conclusion

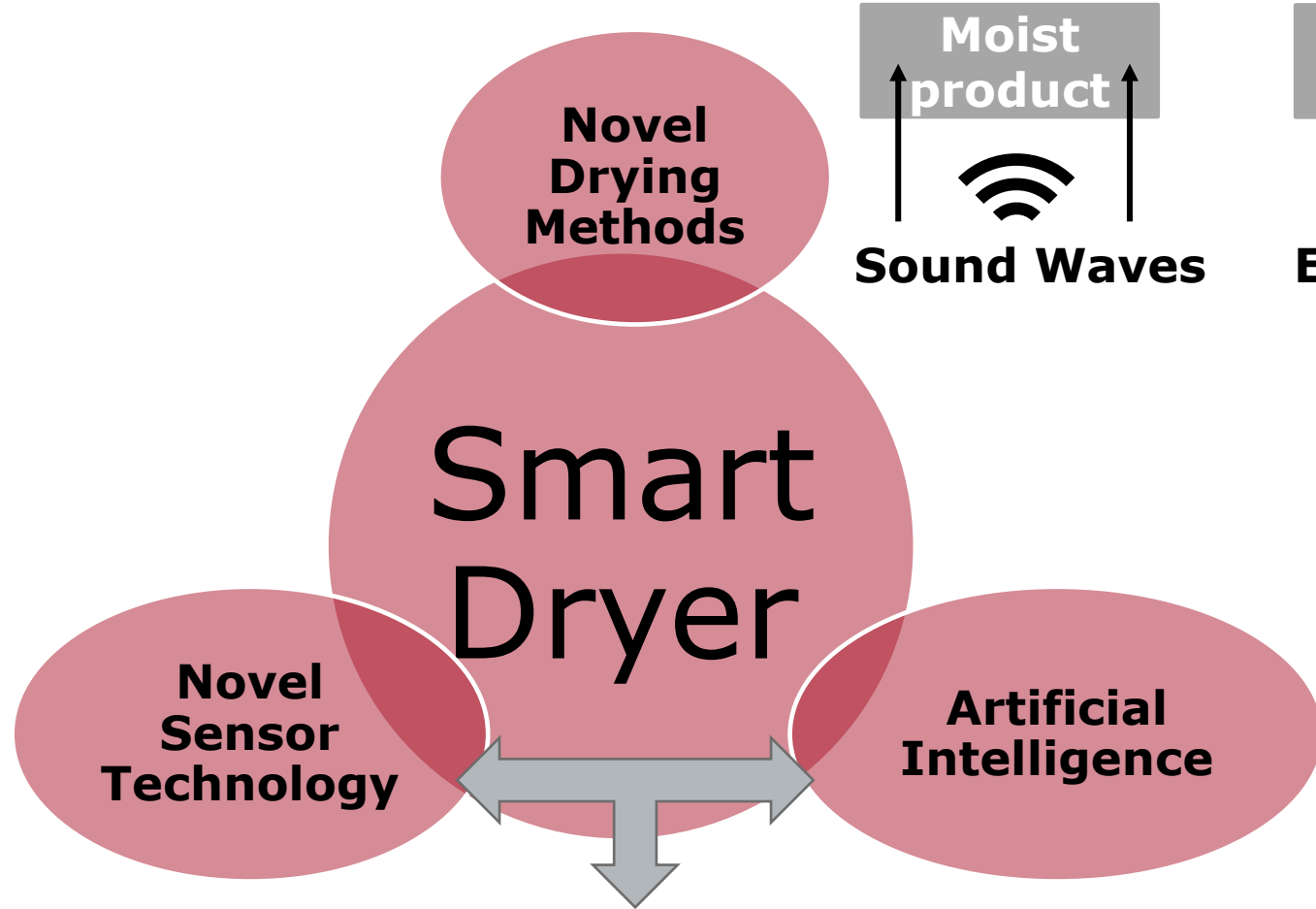


Drying Time with and without SJR

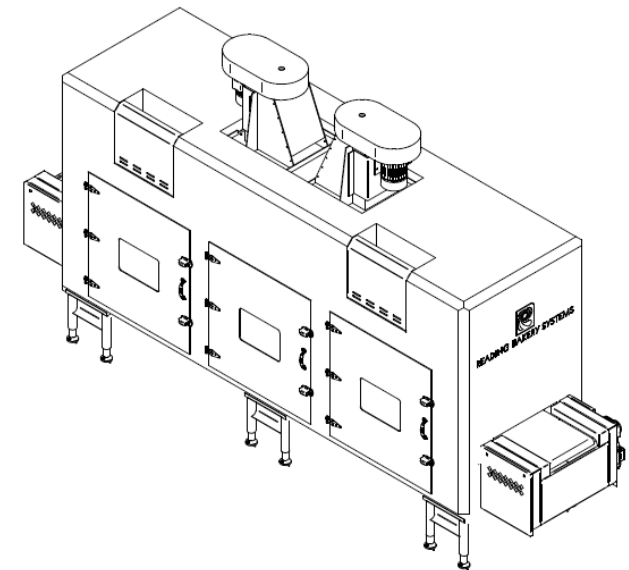
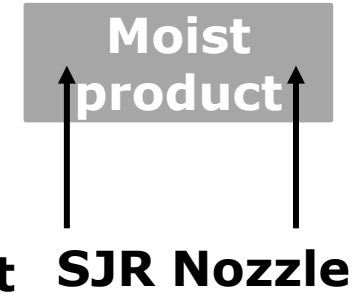
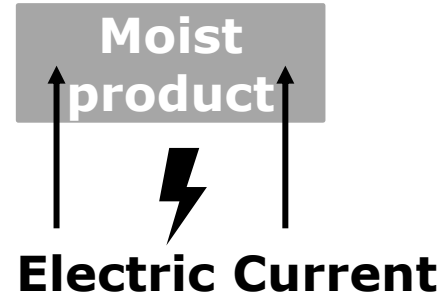
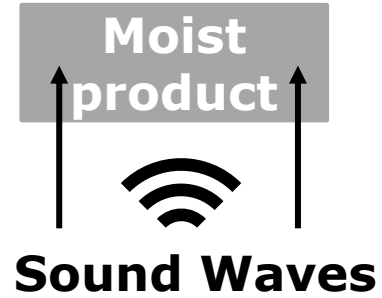


- ❑ 9% net energy savings
- ❑ reduces the emissions by 200 tonnes per day.

Future Studies



To predict the best combination of drying methods



Smart Dryer's 3D Model

Thanks 😊
