

How drum design can effect chipper performance

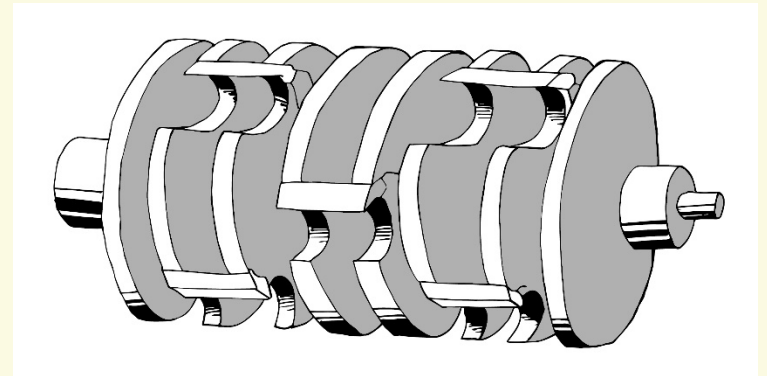
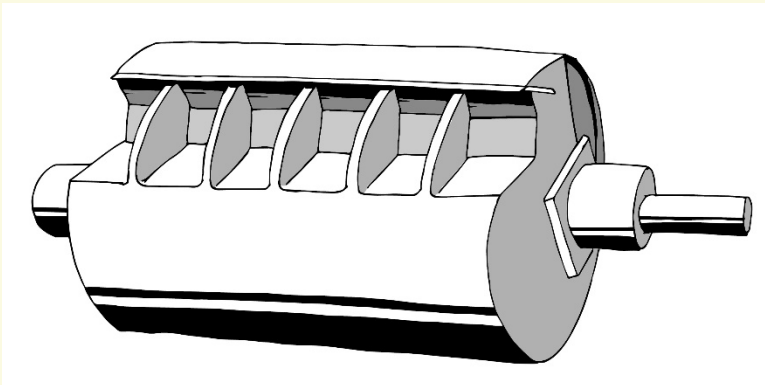
**Natascia Magagnotti, Raffaele Spinelli, Eugenio Cavallo,
Lars Eliasson, Alessio Facello**



FORMEC 2015 – Forest engineering: Making a positive contribution
October 4 – 8, 2015, Linz, Austria

Introduction

- Chipping operations and efficiency
- Industrial drum chippers
 - Closed drum
 - Open drum
- Knives



Goals

- Compare specific effect of closed and open drum design on:
 - Productivity
 - Power demand
 - Fuel consumption
 - Product quality

With different feedstock (logs – branches)

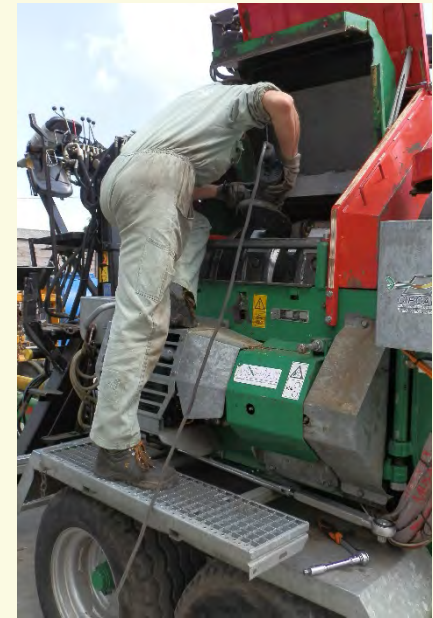
Materials and methods 1/3

- Pezzolato PTH 700/660 - closed drum
- Mus-Max Terminator 7 - open drum

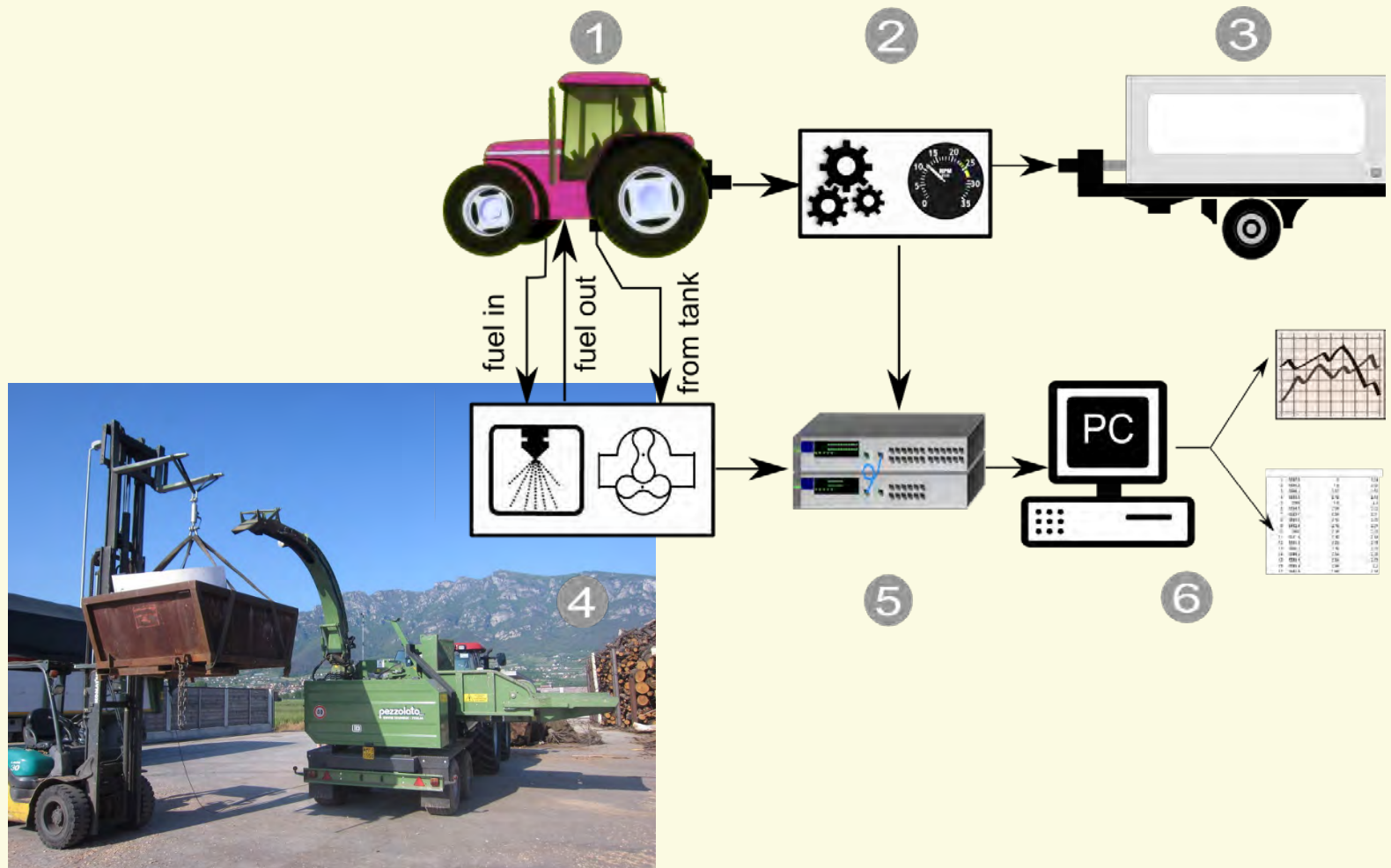
	Unit	Pezzolato PTH 700/660	Mus-Max Terminator 7
Drum diameter	mm	660	600
Drum width	mm	640	600
Weight	kg	840	750
Drum speed	rpm	790	750
Screen	mm	80x80	80x80
Knives	n	2	8
Cut length	mm	20	20
Infeed width	mm	600	600
Infeed height	mm	500	500

Materials and methods 2/3

- Feedstock: chestnut
 - Logs and branches
 - Fresh
- New and worn out knives
- 96 repetitions in total
 - 2 drum design x 2 feedstock x 2 knife conditions x 12 repetition



Materials and methods 3/3

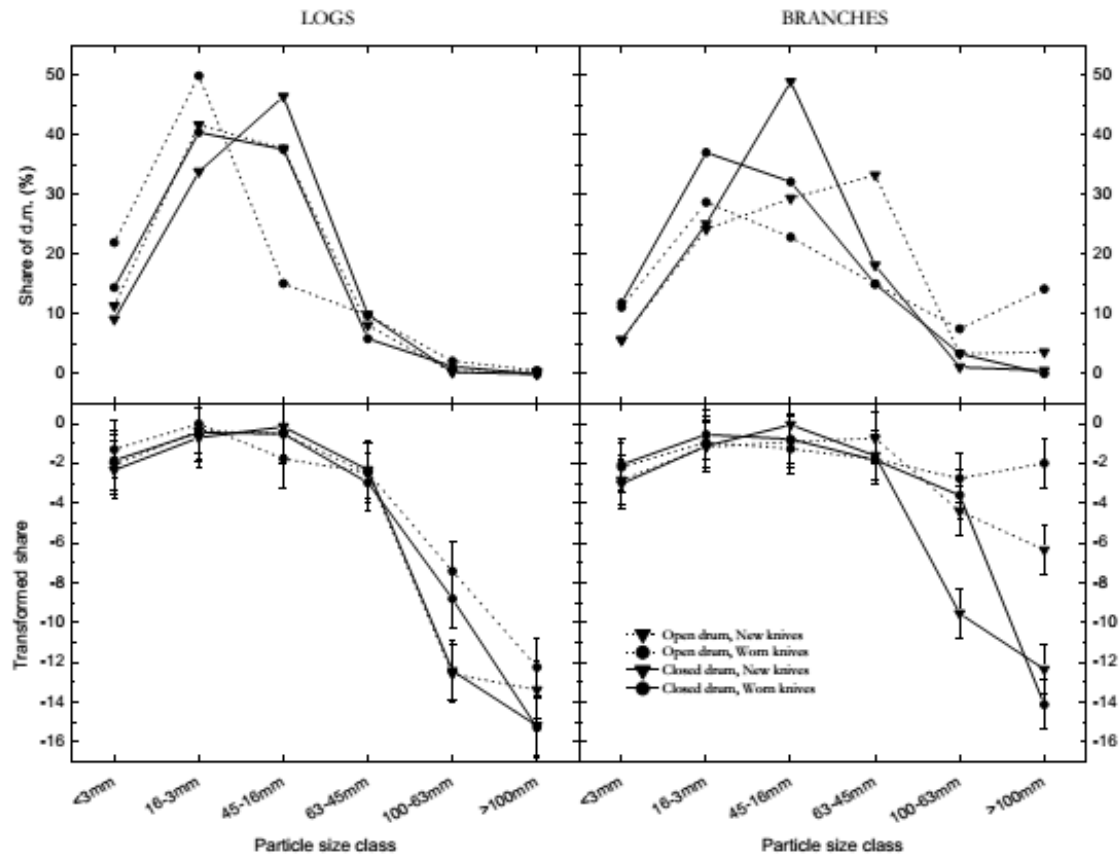


Results 1/2

Drum	Knives	Material	Time $s t^{-1}$	Power kW	Fuel $l t^{-1}$	Energy $MJ t^{-1}$
Closed	New	Logs	385.3 D	65.9A	2.3 D	25.2 D
Closed	New	Branches	454.7 DCB	57.1 B	2.3 D	24.6 D
Closed	Worn	Logs	461.7 DCB	70.7 A	2.9 CD	32.5 CD
Closed	Worn	Branches	644.3 DCB	71.6 A	4.1 B	46.1 B
Open	New	Logs	420.2 DC	56.7 B	2.2 D	23.6 D
Open	New	Branches	772.6 B	41.7 C	3.0 CBD	30.9 CD
Open	Worn	Logs	759.1 BC	56.2 B	3.9 CB	41.5 CB
Open	Worn	Branches	1371.6 A	46.2 C	5.8 A	59.9 A

Results 2/2

➤ Particle size distribution



Conclusion

- Performance affected by
 - Feedstock types
 - Knife wear
- Branches: closed drum design
- Technology choices



Contacts

magagnotti@ivalsa.cnr.it



Acknowledgements: this study was funded by the EU, through the 7th Framework Program (311881) and within the scope of the INFRES Project