

CFD in food & beverages

ADVANCED MODELLING & SIMULATION – AMS –

WWW.POYRY.COM/AMS; WWW.TRANSAT-CFD.COM; AMS@AFRY.COM

JUNE 2020

Food & beverages

DJAMEL LAKEHAL; SECTION HEAD, AFRY AMS.

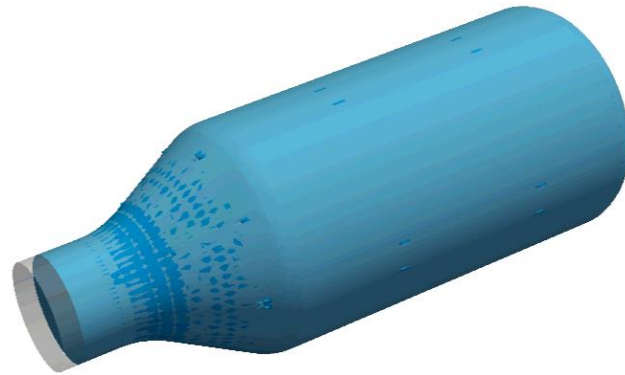
FOR NESTLE SWITZERLAND

Bottle shaking and filling



FOR NESTLE SWITZERLAND

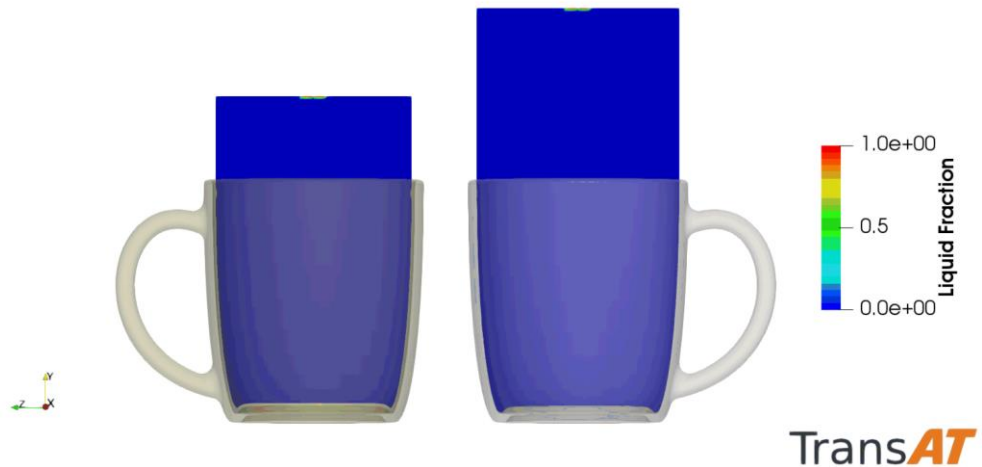
Bottle Emptying



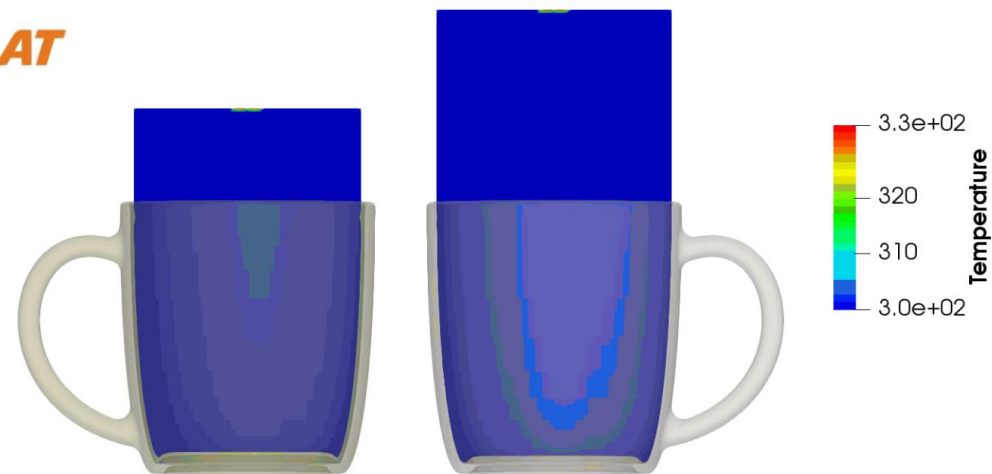
Trans**AT**

FOR NESTLE SWITZERLAND

Coffee Dispensing



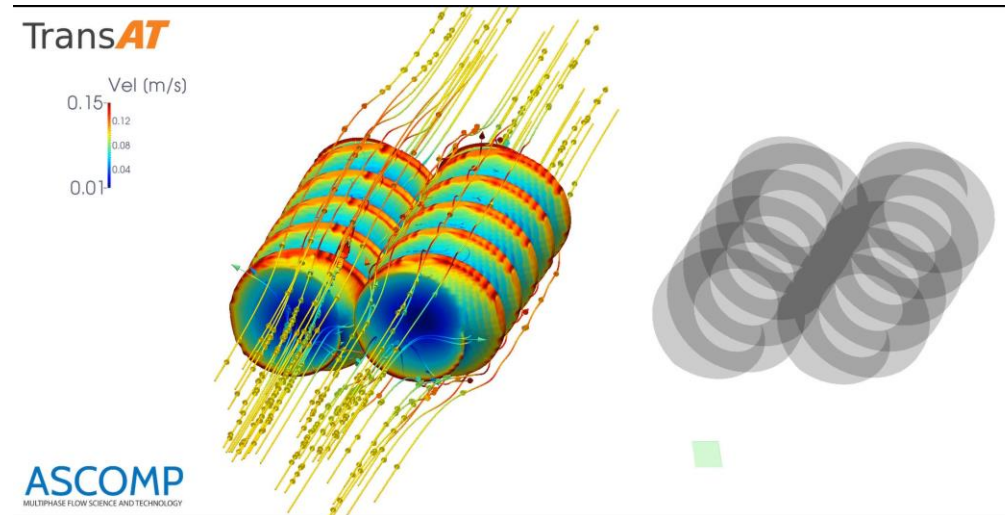
TransAT



TransAT

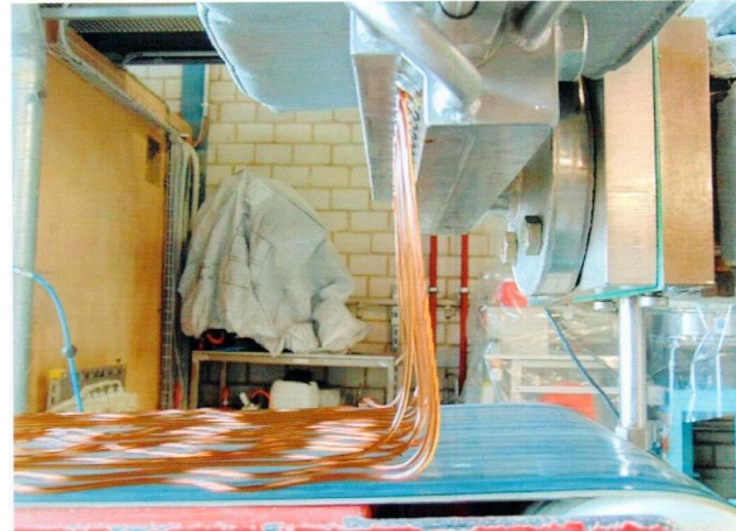
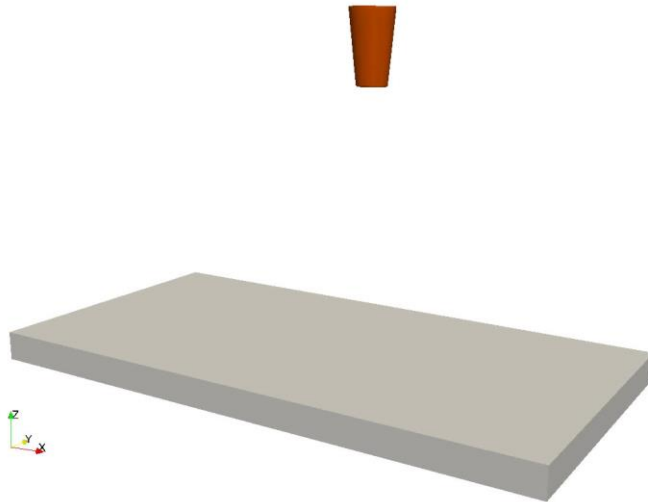
Twin screw mixer: Demonstration

- Single phase
 - Highly viscous liquid
 - Inflow-outflow problem
 - Short screw for demonstration
-
- TransAT: Moving objects feature



FOR BUHLER SWITZERLAND

Strand CONVEYOR



FOR BUHLER SWITZERLAND

PASTA EXTRUDER - 7 HOLE

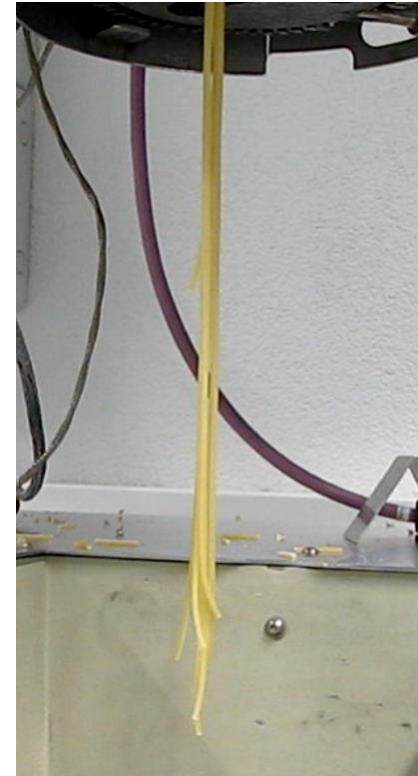
OBSERVATION

- LOW FLOW RATE, CENTRE HOLE HAS HIGHER FLOW RATE
- HIGH FLOW RATE, PERIPHERAL HOLES HAVE HIGHER FLOW RATE

MODEL

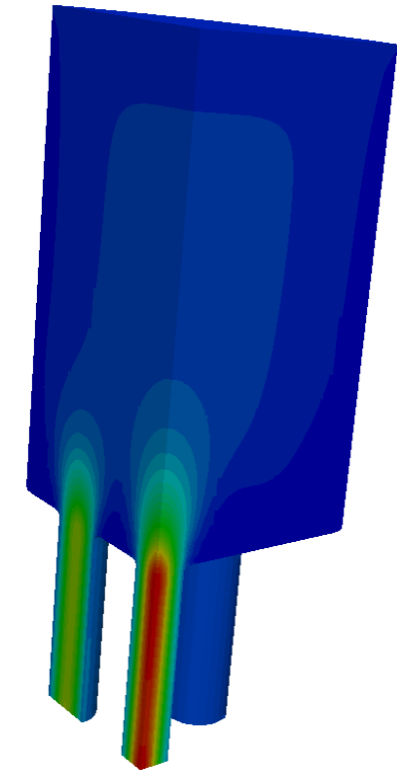
- OLDROYD-B
- EXPONENTIAL-PTT

PRACTICAL APPLICATIONS HAVE HIGH WEISSENBERG NUMBERS

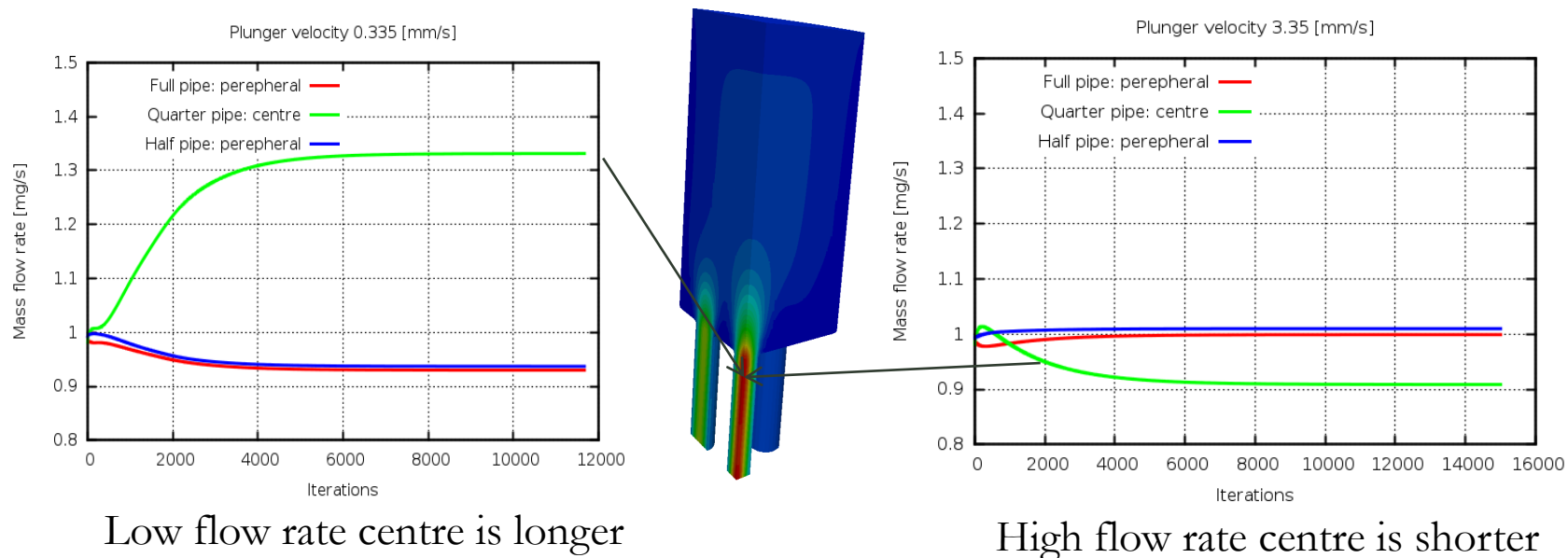


PASTA EXTRUDER - 7 HOLE

- VISCOUS HEATING AT HIGH FLOW RATES
- SLIP IS ENCOURAGED BY USING TEFLON SURFACES
- RHEOLOGY IS COMPLEX (6-MODE UCM WITH LARGE RELAXATION TIME SCALES: GREATER THAN 250 SECS.)
- *STEADY-STATE COMPUTATIONS ARE POSSIBLE WITH TRANSAT*
- CONVERGED SOLUTIONS OBTAINED WITH EXP-PTT MODEL
- NO DIFFERENCE BETWEEN CENTRE AND PERIPHERAL HOLES
 - For different flow rates
 - For different elastic relaxation times
- SLIP IS FOUND TO ACCENTUATE DIFFERENCE IF IT EXISTS BUT DOES NOT CREATE A DIFFERENCE
- ONLY UPSTREAM CONDITION COULD CREATE A DIFFERENCE
- THERMAL EFFECTS?



Pasta Extruder - 7 hole





Making Future

- Advanced Modelling & Simulation
- www.poyry.com/ams; ams@afry.com