SWISCO

DAMPE 2023

Benefits of an innovative auger less grain dampening process

Agenda.

1 DAMPE – System and components

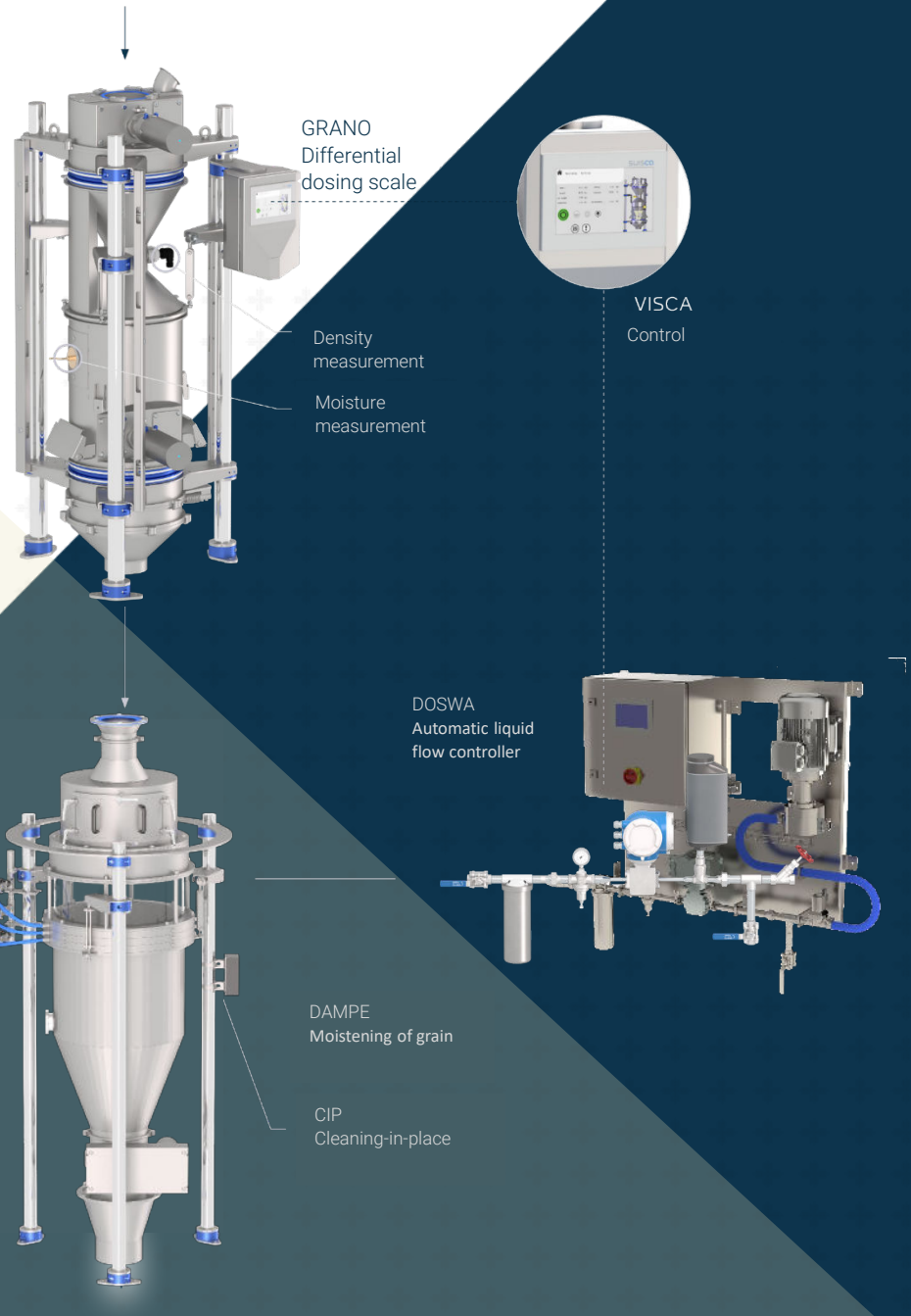
2 Trials / Results

3 Cleaning / Maintenance

DAMPE

Moisture management system

+ Reliable, low-maintenance moisture control system
+ Low energy consumption
+ High quality stainless steel (1.4435) construction and integrated CIP-System supporting food safety
+ SWISCA moisture management system (moisture measurement is part of the scale)
+ High-pressure pump with FC (water dosing independent of line pressure)
+ Steam addition and hot water dosing possible
+ Intuitive VISCA machine control with modern software (connectivity)



DAMPE

Grain dampening

+ Configurable nozzles for variable water dosing capacity
+ Short cleaning times, manually or with CIP system
+ No movable parts in the product chamber

DAMPE

Versions

DAMPE CIP

DAMPE SB

DAMPE MC

DAMPE

Trials / Results

Trial	I	Ash curve „industry“
Trial	II	Energy savings
Trial	III	Microbiology (further study planned)

DAMPE Field Test

Test phases and experimental set-up

1

Task

Comparison of DAMPE with conventional dampening technologies

2

Parameters

Yield / Tempering time
Ash /Tempering time
LAB: Moisture content
Energy consumption

3

Results

Equivalent dampening and lower energy consumption with DAMPE

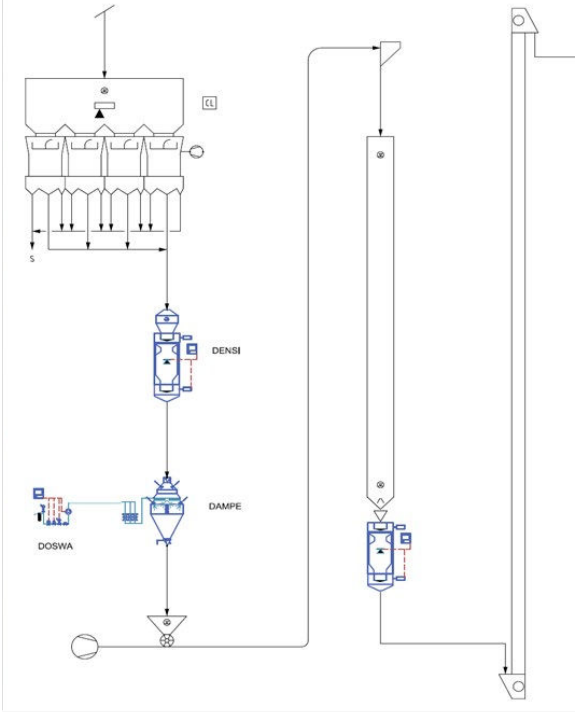
4

Conclusion

Alternative for grain mills with high energy cost and high hygiene requirements

DAMPE Field Test

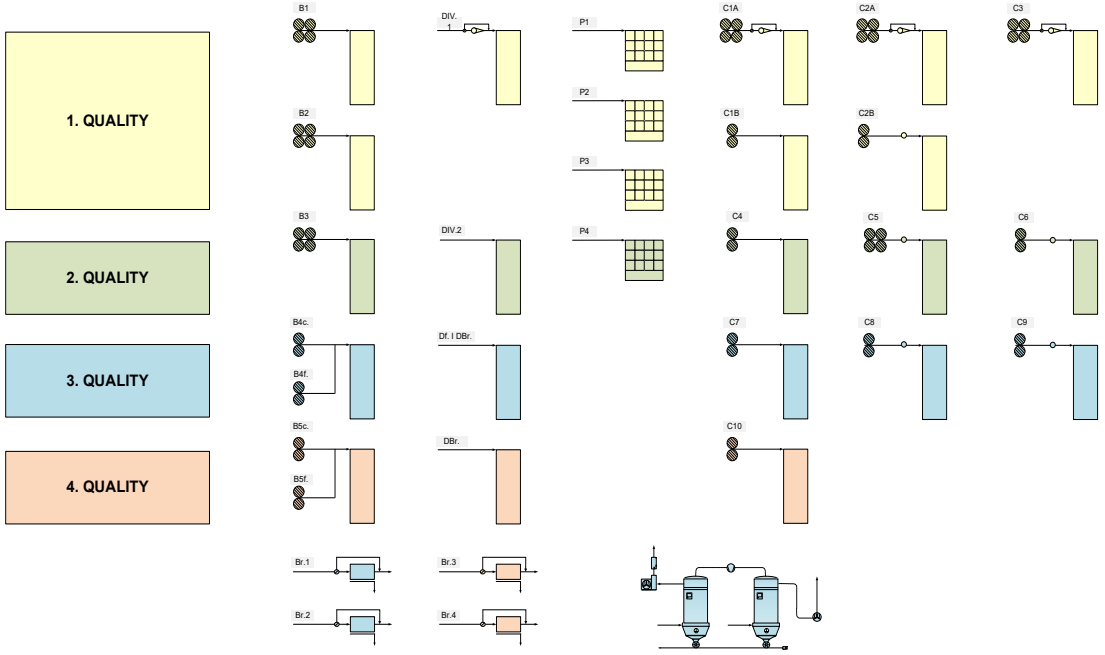
Installation



- DAMPE before Fluid lift into tempering bin
- DENSI and DAMPE at the end of cleaning section directly next to each other
- DOSWA and DAMPE in immediate vicinity
- Commissioning on 16.05.2023
- Up to 20t/h wheat capacity

Trial I: Ash Curve „Industry“

Comparison of different grain dampening methods on an industrial scale



Ash curve on an industrial mill

- Comparison SWISCA system / intensive dampening system
- Input product and all finished products of the mill were measured and sampled respectively
- (2x58) Passage flours to determine the ash curve
- Total test duration 4 days without laboratory analyses
- A total of 250 samples were analyzed in 900 analyses at the DIGeFa laboratory

Parameters:

Grinding behavior, yield on the mill, product moisture, ash content, starch damage

Trial I: Ash Curve „Industry“

Preparation

MILL DATA:

Mill:
Location:
Region:
Country:
Diagramm:
Capacity B1 (t/24h)
Year:

CEREAL DATA:

Pos.	Passage		Weight (g)	Time (s)	H2O %	Ash %	Samp. N°.
Colu	Column2	C.	Column4	Colur	Colum	Colum	Colum
33	C1A II b III	B	680	60	13.90	0.33	64
28	C1A II a I	J	3807	60	14.40	0.35	60
30	C1A II a III	K	602	60	13.90	0.35	61
29	C1A II a II	J	2195	60	14.30	0.35	62
31	C1A II b I	K	2972	60	14.20	0.35	63
32	C1A II b II	A	3166	60	14.30	0.35	65
37	C 2Aa II		680	60	13.20	0.36	18
48	C 3b II		874	60	13.40	0.36	33
36	C 2Aa I		6546	60	13.50	0.37	19
39	C 2Ab II		952	60	13.30	0.37	20
38	C 2Ab I		6896	77	13.50	0.37	21
24	C 1A I a I	K	7517	60	14.80	0.37	26
26	C 1Ab I	E	7575	60	14.80	0.37	28
41	C 2A II II		777	60	12.70	0.37	52
40	C 2A II I		3846	90	12.90	0.37	54
43	C 2B I		5380	60	14.50	0.38	30
46	C 3a II		1088	60	13.40	0.38	31
45	C 3a I		8178	60	13.60	0.38	32
47	C 3b I		9168	60	13.70	0.38	34
50	C 5 I		10081	60	13.10	0.4	39
35	C 1B II		1418	60	15.00	0.44	17
34	C 1B I		2467	60	15.20	0.48	16
16	DIV.1b I	F	4409	60	15.30	0.52	13
49	C 4		3632	60	14.30	0.52	35
18	DIV.2 I		796	60	15.10	0.53	3
4	B2a	G	2040	60	15.70	0.54	2
14	DIV.1a I		4604	60	15.40	0.54	10
6	B2c	B	1573	60	15.60	0.54	15
52	C 6 I		4234	60	13.90	0.54	37
5	B2b	C	1612	60	15.70	0.55	7
9	B3c	G	1535	60	15.60	0.55	24
53	C 6 II		1962	60	13.80	0.56	36
7	B3a	H	1573	60	15.60	0.57	22

Ash curve data

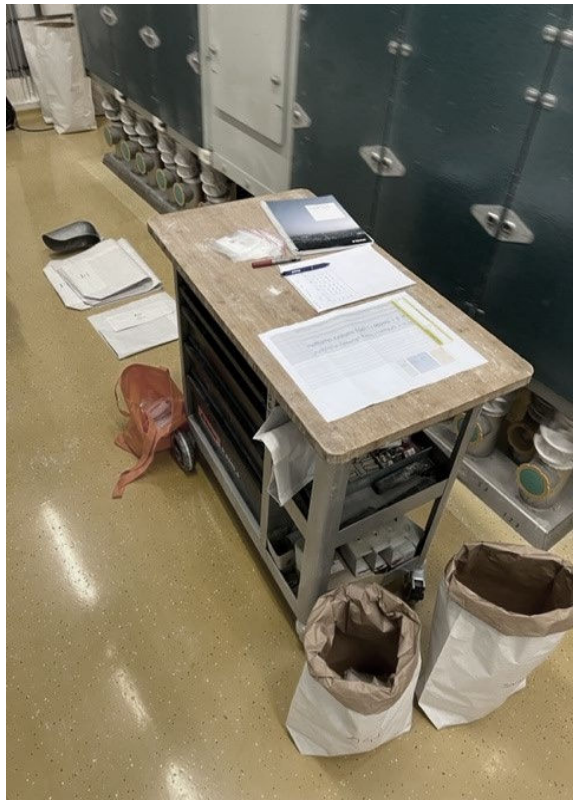
- The same wheat mixture was used for both ash curves.
- Identical water addition of 11.5 - 16.5% → Corresponds to a water addition of around 6%.

Type	Country	Year	Blend in %	Weight hl	H2O %	Ash	Protein	Weight in 1000 grains
Raw Wheat	Switzerland	2022	100	83.7	11.6	1.69	14.0	35.1
B1	Switzerland	2022	100	79.4	16.5	1.68	14.2	35.3

- The test was run on the same line, the cleaning efficiency was identical
- Cleaning capacity 15t/h with 980-1000l/h water addition
- Tempering time 24 hours
- Identical mill recipe for both trials
- Identical mill setting → B1 capacity 12t/h, roller setting, purifier setting
- The ash curves were drawn in June at the same time of day on two consecutive days to have comparable climatic conditions in the mill

Trial I: Ash Curve „Industry“

Verification



When evaluating the ash curve, the following preconditions were taken into account:

- Yield sum of the passage flour collection corresponds to the yield of the main flours 1 & 2.
- Ash content of the passage flours corresponds to the ash content of the main flours
- Whole grain ash content is consistent with the sum of all mill end products (sum of ash content from flours and bran)
- Yield and ash content of the two wheat conditioning methods in cross-comparison is matching and plausible

All these points were validated; hence a comparison is possible.

Trial I: Ash Curve „Industry“

Results

DAMPE wheat conditioning

Type	Country	Year	Blend in %	Weight hl	H2O %	Ash	Protein	Weight in 1000 grains
Raw Wheat B1	Switzerland	2022	100	83.3	11.6	1.67	14.3	35.9
	Switzerland	2022	100	79.2	16.6	1.63	14.2	35.6

End Product	Yield		H2O	%Ash S.S.	
	%	Total %	%	% i.Tr.	Media %
Flour 1	32	32	13.7	0.380	0.38
Flour 2	46	78	14.5	0.760	0.60
Bran	19.3	97.3	14.2	5.800	1.63

Intensive-dampener wheat conditioning

Type	Country	Year	Blend in %	Weight hl	H2O %	Ash	Protein	Weight in 1000 grains
Raw Wheat B1	Switzerland	2022	100	83.7	11.6	1.69	14.0	35.1
	Switzerland	2022	100	79.4	16.5	1.68	14.2	35.3

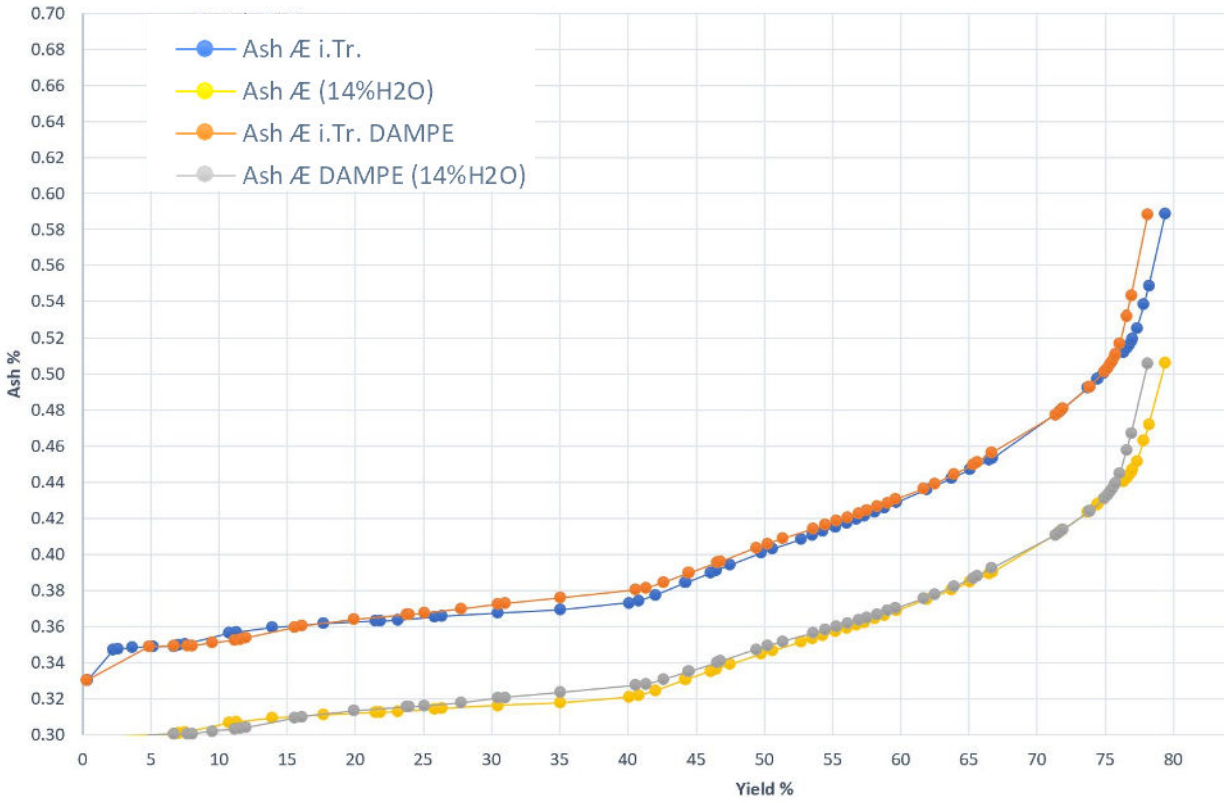
End Product	Yield		H2O	%Ash S.S.	
	%	Total %	%	% i.Tr.	Media %
Flour 1	31.4	31.4	13.7	0.390	0.39
Flour 2	46.9	78.3	14.4	0.750	0.61
Bran	19.3	97.6	13.8	6.170	1.71

Comparison of total flour of the compared methods

Deviation → percentage points 0.3 yield and 0.01 ash (< measurement uncertainty)

Trial I: Ash Curve „Industry“

Achieved results – curve comparison



Results ash curve
Comparison of DAMPE and Intensive-dampener

- The curves have an identical shape and path
- There is little difference in yield and ash content between the two conditioning methods
- No differences in starch damage from the grinding passage flours
- Slight differences are caused by measurement uncertainties when drawing the samples and in the laboratory

Trial II: Energy Consumption

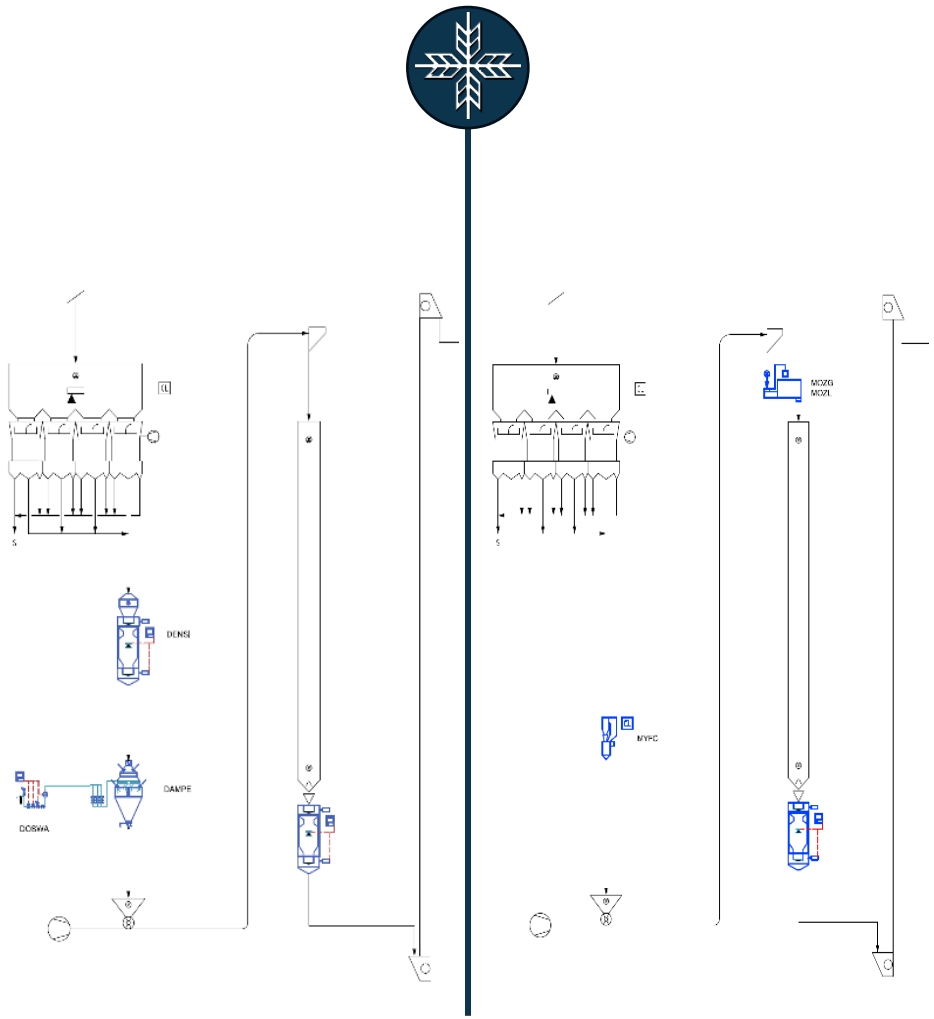
DAMPE vs. Intensive-Dampener

DAMPE wheat conditioning

Installed power: 1.1KW
Measured output: 16t/h
Water dosage: 780 l/h
Measured current consumption:
0.32 A
Effective absorbed power: 0.19 kW

0.19 x 24 = 4.56 Kwh x 330 T
= 1504.8 Kwh x 0.20 =

300 EURO p.a.



Intensive-Dampener wheat conditioning

Installed power: 7.5KW
Measured output: 16t/h
Water dosage: 780 l/h
Measured current consumption:
9.2 A
Effective absorbed power: 5.3 kW

5.3 x 24 = 127.2 Kwh x 330 T
= 41976 Kwh x 0.20 =

8`400 EURO p.a.

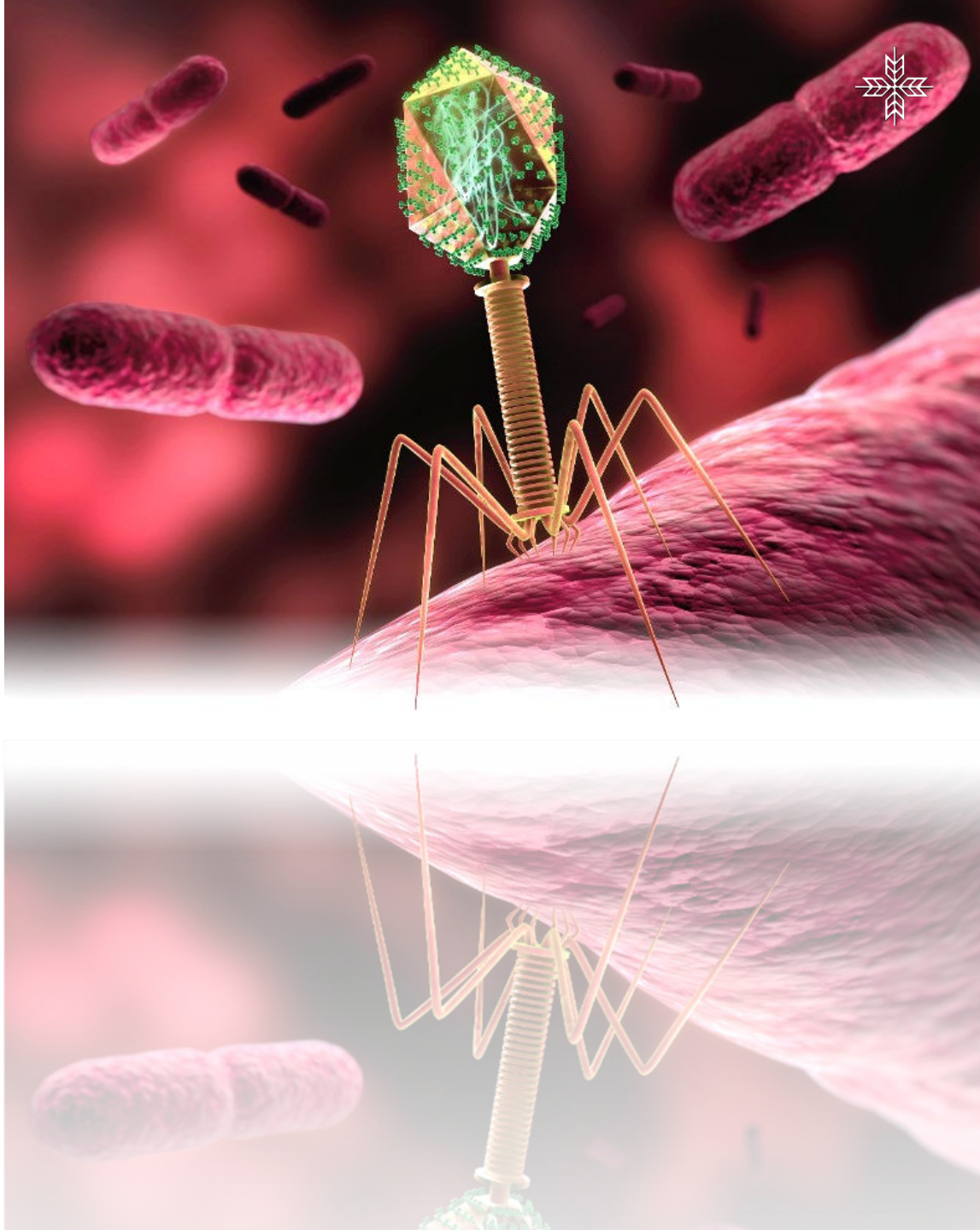
Trial III: Microbiology

Trials on bacteria reduction „USA“

- Preliminary trials in the USA to reduce E-coli bacteria (previously applied to wheat).
- Specific concentration of phage-water-solution applied to contaminated wheat

Results:

- Phage concentration was effective in reducing E-coli
- No difference in milling properties between treated and untreated product
- No functional or organoleptic differences in the treated product (determined by baking trials).
- Further trials to be conducted in the future



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Manual cleaning

Cleaning procedure after operation

Manual Cleaning

Cleaning procedure after operation

Procedure

Open upper access door

- Only dry dust flue is found in the upper part, like in piping

Open the maintenance door on the weighing hopper

- In the upper product area moist residues are on the wall
- These can be easily removed with a dry-cleaning cloth
- On the walls and the outlet flaps; a few grains can remain stuck in isolated cases.

The total cleaning effort after a production stop is < 15 minutes.

Manual Cleaning

Cleaning procedure after operation

Inlet area

The main function of the inlet area is to distribute the product flow into a curtain

The design of the inlet cone with a gap to the dampening area ensures that no splash water enters the inlet area

Inlet area is dry after operation

Dry flue dust like that in piping can be cleaned easily

Manual Cleaning

Cleaning procedure after operation

Conclusion

DAMPE vs. Intensive-Dampener

Based on our tests with the same raw product quality and mill setting or operating parameters:

- The grinding behavior on the mill does not change, the mill intermediate products are comparable and there are no shifts on the mill.
- Both methods achieve the required finished product quantity and quality with the same tempering times. Yield, moisture, ash content and starch damage were analyzed.
- With DAMPE, wheat conditioning can be achieved sustainably with low energy input.
- With DAMPE, the surface distribution of the water on the grain - due to the spray mist - is advantageous and favor's penetration into the grain, as the dampened wheat does not need to be mixed and yet the same tempering time is sufficient to produce end products of the required quality.

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Thank you.