CORRUGATION AND MAINTENANCE MANAGEMENT





NOT ALWAYS IS THE CORRUGATION MAINTENANCE SEEN AS A PRIORITY





DIFFICULTIES IN UNDERSTANDING AND APPLYING A COORECT MAINTENANCE IN THE CORRUGATION

- Lack of personnel
- Lack of qualified personnel
- Tight production requirements
- Lack of knowledge on the matter



EFFICIENT CORRUGATION

DIRECT CORRELATION



CORRUGATION & YIELDS REPORT

With a Δ of **0,5%** in yield for a 300TpD flour mill

- ➤ The flour daily loss is 600 €
 ➤ Annual loss = <u>150.000 €</u>
- > 150.000 € lost due to INEFFICIENCY



CORRUGATION IMPACT ALSO:

- Energy consumption
- Moisture loss
- Product quality



THE GRINDING OCCURS DUE TO:

- Pressure between rolls
- Cutting action between rolls
- Flattening due to differential speed



CUTTING ACTION PRIMARILY IN THE CORRUGATED ROLLS COMPRESSED ACTION PRIMARILY IN THE SMOOTH ROLLS



AVERAGE CONSUMPTION IN GRINDING 1.500 Kg/h:

Smooth Rolls: 13Kwh

Corrugated Rolls: 4,5 Kwh

<u>Δ 8,5Kwh = + 200%</u>

Mainly due to a different type of working action



THE MORE A CORRUGATION WEARS OUT

THE MORE THE ROLL WILL PERFORM AS A SMOOTH ROLL

HIGHER THE ENERGY CONSUMPTION



REFERENCE CORRUGATION CHARACTERISTICHS:

- Number of flutes per cm: 7,00
- > Number of flutes on the circumference: 550
- ➢ Working angles: 50/70
- ➤ Land: 0,15 mm

CALCULATED DEPTH OF THE FLUTE:

<u>0,324 mm</u>



RATIO BETWEEN CORRUGATION DEPTH AND POWER REQUIRED

1/10 of mm less depth



+ 2,62 Kwh





THIS IS CONSIDERING IDENTICAL CONFIGURATIONS AND ONLY DUE TO THE VARIATION IN NATURAL WEARING OF THE CORRUGATION



HIGHER ENERGY COST:

Cost Kwh = 0,16 €

2,62 Kwh → annual € 2.500,00

For every 1/10 of mm



IT IS POSSIBLE TO COMPENSATE COMPROMISING THE FOLLOWING:

- > PLANT BALANCING
- > PRODUCT QUALITY
- > EXTRACTION
- > CAPACITY





THIS IS A DIRECT RELATION



HIGHER MOISTURE LOSS:

For every additional Kwh in energy consumption

+ 0,6 ÷ 0,7% of loss compared to the added water during conditioning



HIGHER MOISTURE LOSS:

+ 0,6 ÷ 0,7% of loss compared to the added water during conditioning

↓ € annual 9.000



WORE OUT CORRUGATION TRANSLATE IN:

> HIGHER VOLUME



HIGHER VOLUME:







CURRENT METHODS FOR THE MONITORING OF THE CORRUAGTION:

> Experience

Is it a reliable method? Especially is it constant in time?



CURRENT METHODS FOR THE MONITORING OF THE CORRUAGTION:

- sieving test historical data
- historical data on energy consumption monitoring

COMPLEXED SYSTEMS AND NOT ALWAYS APPLICABLE



CURRENT METHODS FOR THE MONITORING OF THE CORRUAGTION:

> All the indicated system are:

- > Not reliable
- Complicated to execute
- ➢ Hard to analyze

THE REQUIREMENT IS TO HAVE REPEATABLE SYSTEMS



OCRIM'S SOFTWARE TO CALCULATING THE CORRUGATION DEPTH

DATI DI INPUT

Diametro rullo[mm]:	250
Righe sulla circonferenza INRI:	1000
righe cana chechnerenza	1000
Angolo di Taglio[°]:	35
Angolo di Dorso[°]:	55
D: //	0.400
Pianetto	0,100

DATI DI OUTPUT

P (passo righe) [mm]:	0,785
Righe per cm[NR]:	12,73
L [mm]:	0,685
tg α[rad]:	0,700
tg β [rad]:	1,428
c (profondità righe) [mm]:	0,3220
c (profondità righe)[µm]:	322



OCRIM'S SOFTWARE TO CALCULATING THE CORRUGATION DEPTH

cos α	[rad]:	0,819
\coseta	[rad]:	0,574
Lt (lunghezza taglio)[n	nm]:	0,393
Ld (lunghezza dorso)	[mm]:	0,561
Sp (semiperimetro triangolo) [I	mm]:	0,820
A (superficie triangolo)[n	nm²]:	0,110
r (raggio particella)[I	mm]:	0,135
d (diametro particella)[mm]:	0,269
d (diametro particella)[μ m] :	269



PARAMETERS WHICH INFLUENCE THE LIFE OF CORRGUATION:

- > Type of wheat to be milled
- Specific loads
- Rollermill mechanical reliability
- Corrugation workshop
- > Roll quality



NEW ROLL MECHANICAL WORKSHOP





SHAFT INSERT PROCESS BY MEANS OF LIQUID NITROGEN – OCRIM PATENT







CORRUGATION DEFECT – «SHADED BAND»





THE IMPORTANCE OF THE ALLIGHMENT BETWEEN THE TOOL AND FLUTE





TRADITIONAL TOOL





OCRIM TOOL WITH AND WITHOUT THE INSERT





GRINDING/FLUTING MACHINE





THANK YOU!

