CORRUGATION AND MAINTENANCE MANAGEMENT
NOT ALWAYS IS THE CORRUGATION MAINTENANCE SEEN AS A PRIORITY

LOSSES IN THE MANAGEMENT OF THE PLANT
DIFFICULTIES IN UNDERSTANDING AND APPLYING A CORRECT MAINTENANCE IN THE CORRUGATION

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

EXTRACTION OPTIMIZATION

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 = 150.000 €
- 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

Δ 8,5Kwh = + 200%

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 CHARACTERISTICS:

- 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:

0,324 mm
RATIO BETWEEN CORRUGATION DEPTH AND POWER REQUIRED

1/10 of mm less depth

+ 2,62 Kwh
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
HIGHER POWER

HIGHER MOISTURE LOSS

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:

$+ 0.6 \div 0.7\%$ of loss compared to the added water during conditioning

€ annual 9.000
WORE OUT CORRUGATION TRANSLATE IN:

➢ HIGHER VOLUME
HIGHER VOLUME:

=

LOWER CAPACITY  LOWER $H_2O$
CURRENT METHODS FOR THE MONITORING OF THE CORRUPTION:

- Experience

- Is it a reliable method? Especially is it constant in time?
CURRENT METHODS FOR THE MONITORING OF THE CORRUPTION:

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

COMPLEXED SYSTEMS AND NOT ALWAYS APPLICABLE
CURRENT METHODS FOR THE MONITORING OF THE CORRUPTION:

- All the indicated systems are:
  - Not reliable
  - Complicated to execute
  - Hard to analyze

THE REQUIREMENT IS TO HAVE REPEATABLE SYSTEMS
OCRIM’S SOFTWARE TO CALCULATING THE CORRUGATION DEPTH

<table>
<thead>
<tr>
<th>DATI DI INPUT</th>
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<tbody>
<tr>
<td>Diametro rullo [mm]</td>
<td>250</td>
</tr>
<tr>
<td>Righe sulla circonferenza [NR]</td>
<td>1000</td>
</tr>
<tr>
<td>Angolo di Taglio [°]</td>
<td>35</td>
</tr>
<tr>
<td>Angolo di Dorso [°]</td>
<td>55</td>
</tr>
<tr>
<td>Pianetto [mm]</td>
<td>0,100</td>
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<table>
<thead>
<tr>
<th>DATI DI OUTPUT</th>
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<tbody>
<tr>
<td>P (passo righe) [mm]</td>
<td>0,785</td>
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<tr>
<td>Righe per cm [NR]</td>
<td>12,73</td>
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<tr>
<td>L [mm]</td>
<td>0,685</td>
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<tr>
<td>tg α [rad]</td>
<td>0,700</td>
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<tr>
<td>tg β [rad]</td>
<td>1,428</td>
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<tr>
<td>c (profondità righe) [mm]</td>
<td>0,3220</td>
</tr>
<tr>
<td>c (profondità righe) [μm]</td>
<td>322</td>
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</table>
OCRIM’S SOFTWARE TO CALCULATING THE CORRUGATION DEPTH

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
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<tbody>
<tr>
<td>cos α</td>
<td>rad</td>
<td>0.819</td>
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<tr>
<td>cos β</td>
<td>rad</td>
<td>0.574</td>
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<tr>
<td>Lt (lunghezza taglio)</td>
<td>mm</td>
<td>0.393</td>
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<tr>
<td>Ld (lunghezza dorso)</td>
<td>mm</td>
<td>0.561</td>
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<tr>
<td>Sp (semiperimetro triangolo)</td>
<td>mm</td>
<td>0.820</td>
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<tr>
<td>A (superficie triangolo)</td>
<td>mm²</td>
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<tr>
<td>r (raggio particella)</td>
<td>mm</td>
<td>0.135</td>
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<tr>
<td>d (diametro particella)</td>
<td>mm</td>
<td>0.269</td>
</tr>
<tr>
<td>d (diametro particella)</td>
<td>μm</td>
<td>269</td>
</tr>
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</table>
PARAMETERS WHICH INFLUENCE THE LIFE OF CORRUGATION:

- 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 ALIGNMENT BETWEEN THE TOOL AND FLUTE
OCRIM TOOL WITH AND WITHOUT THE INSERT
GRINDING/FLUTING MACHINE

«GFI»
THANK YOU!