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PRODUCTION EXPERTISE - MANAGEMENT SKILLS

NAMADIN SANAT CO.

PROCESS CONTROL SOLUTIONS

In the name of **GOD**

Process control for optimising grinding performance in ball mills

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www.namadinsanatco.com

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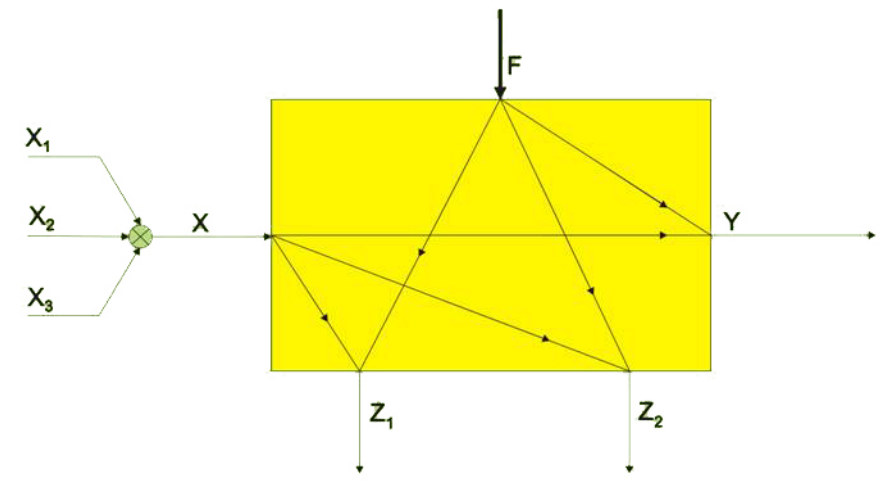
Structure of open cycle cement mill



Y – output regulable parameter (fineness of grinding)
Z1, Z2 – indirect measurable parameters(the loading of first and second chamber of the mill);
F – disturbances (the changes in the grindability of initial materials, wearing out of the ball charge and the mill lining);
X- flow rate of the material sent for grinding into the mill;
X = X1 + X2 + X3
where
X1, X2, X3 – input materials(clinker, gypsum, additive)

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THE ADVANTAGES OF THE USED PRINCIPLE:

♦ FG and FD aren't influenced from the work of near-by mills and other aggregates;

♦ Measuring of resistant properties of material layer in the zone of sensor mounting and obtaining in time truthful information for their changes;

♦ Eliminating of uninformation resonance vibrations of mill's case;

♦ In case of FG - change it can control the wearing out of grinding bodies and lining;

♦ At abruptly FG change it can define a mill breakdowns (destruction of grids and lining, clogging up from inner bodies etc);

♦ The sensor signal is sent at distance up to 200m without additional amplification.

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MICROPROCESSOR MODULE MILLCONT 2

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CONTROL LAWS

$$Y_n = \left[P_r X_n + \frac{T}{T_i} \sum_{K=0}^{n} X_K + \frac{T_d}{T} \left(X_n - X_{(n-1)} \right) \right] \frac{100}{f_{обхв.}} \%$$

- Y_n - output control value;
- $X_n, X_{(n-1)}$ - debalance between set point (SP) and factor of grinding (FG);
- P_r -gain coefficient;
- T_i -time constant of integration;
- T_d - time constant of deviation
- T -tact of the control law ;
- $f_{обхв.}$ - range of the input signal

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Mill Characters

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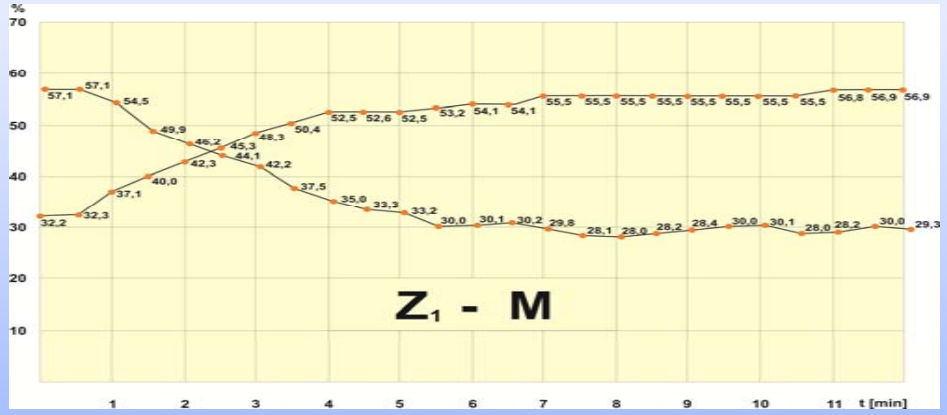

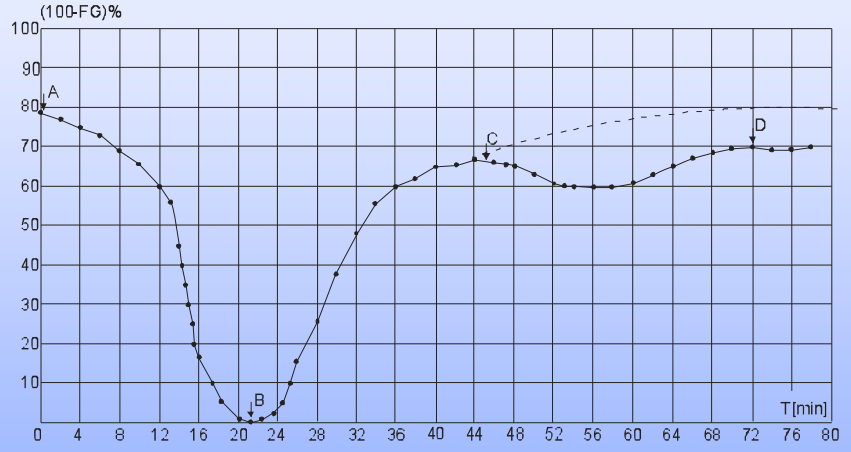

Transitional characteristics

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Installation Picture

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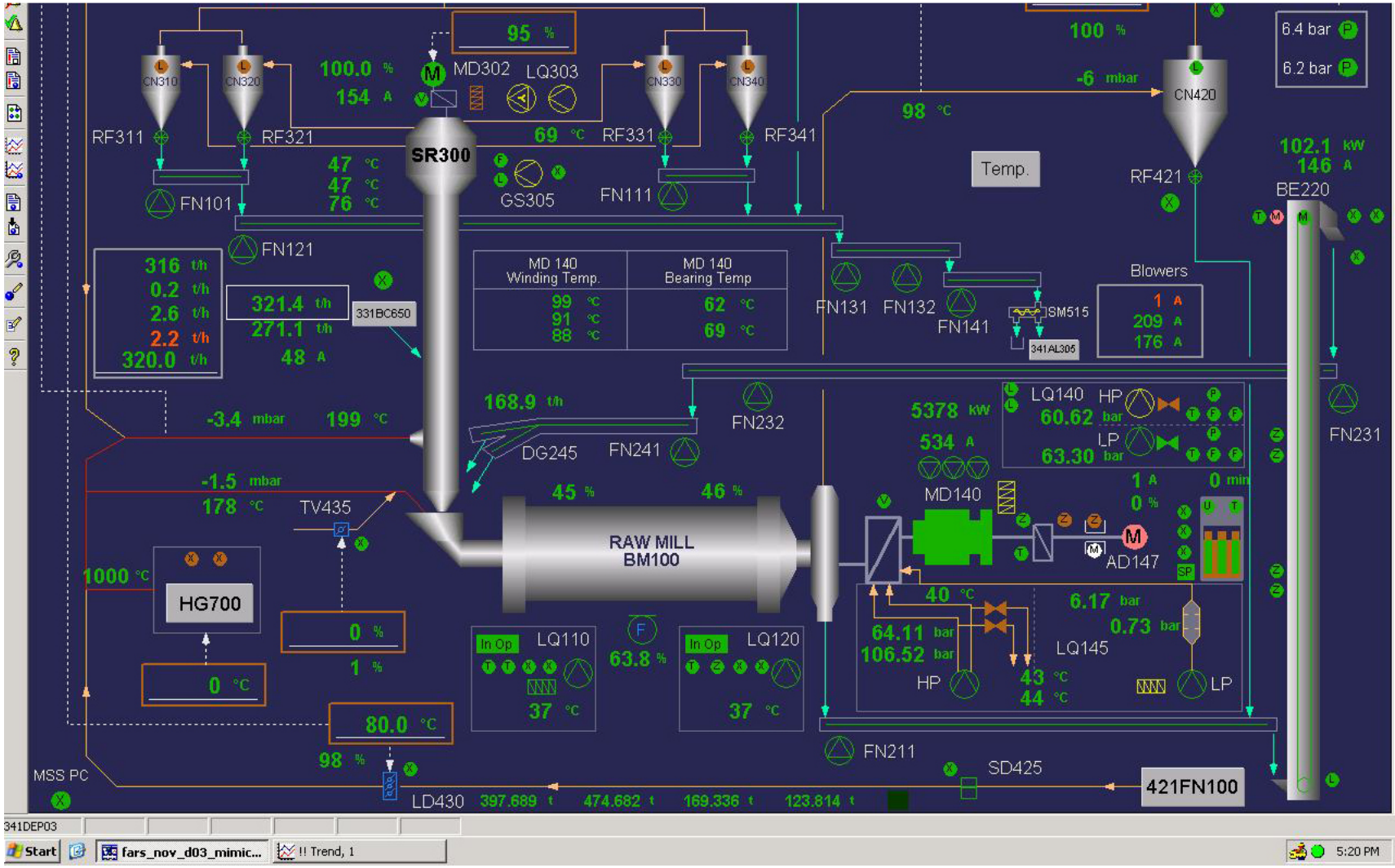

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Installation Picture

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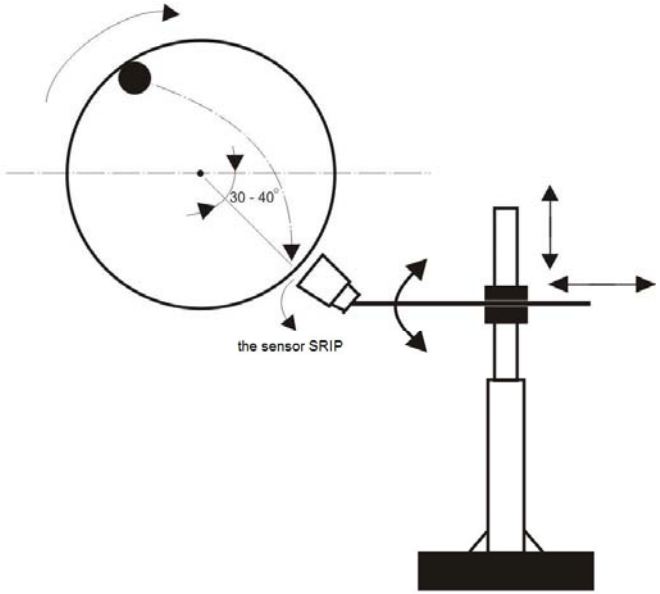

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CONCLUSION

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The nowadays running of control system implemented on more than 40 cement and raw material mills shows the following:

- **The mill will be controlled automatically**
- **The mill output grows with 6 % to 25 %;**
- **The specific energy consumption is reduced approximately to the same percentage;**
- **The durability of the lining and grinding bodies extends with about 15%;**
- **The mean quadratic deviations of ready product by fineness of grinding are reduced with an average of 1,3 times in comparison with those at manual control of grinding process;**
- **The average time for system buying back is 2 months.**
- **Besides these good economic results the control system for open/close cycle cement mill built up on basis of the microprocessor system MILLCONT 2 control of grinding process and improves the overall labor organization of the workshop.**
- **The system can be installed on Raw Material, Cement, Ore, Gypsum and … mills in open or close cycle and also in wet or dry mills.**
- **This system is presented by Namadin Sanat Co, in the middle east territory and is installed more than 20 mills in this area.**
- **For further information you may visit www.namadinsanatco.com**
- **Tel: 0098-311-233-9560 Fax: 0098-311-233-2848**

1. M. Khoozestani "Grinding process control system of two stage raw mill", BULCAMC, 2008, Sofia, BULGARIA

2. T. Penzov et al. "New system for control of grinding process", XXIII International mineral processing congress, 3 – 8 September, 2006, Istanbul, TURKEY

3. ZKG international magazine2006