INSTALLATION OF AN AUTOMATON SYSTEM IN THE TERMINAL OF THE TANDEM

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Surface building 8000 m²
The contents

- The ALTO facility
- The Tandem
- Overview
- The problem of Sparks and SF6
- The choice
- Installation of the new automaton system
- The tests
- Conclusions
The Tandem of ORSAY

L=25 m – Ø=6 m
320 m³ of SF6 under 8 bars

Accelerating structure glass / metal
Maintained in compression

<table>
<thead>
<tr>
<th>Tandem/ALTO beam schedule</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilan</td>
<td></td>
</tr>
<tr>
<td>Time of scheduled and realized functioning (h)</td>
<td>3624</td>
</tr>
<tr>
<td>Number of week</td>
<td>27</td>
</tr>
<tr>
<td>Conditionning(h)</td>
<td>240</td>
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<tr>
<td>Tests ⁴⁰Ca, ⁴⁸Ca (h)</td>
<td>120</td>
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<td>Time attributed)to the physics(h)</td>
<td>3284</td>
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<tr>
<td>Breakdowns (h)</td>
<td>260</td>
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<tr>
<td>Number of operators</td>
<td>7</td>
</tr>
<tr>
<td>Ion beam on Target (h)</td>
<td>3024</td>
</tr>
<tr>
<td>%</td>
<td>92%</td>
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</tbody>
</table>
1993 installation of the ion source ORION in the 15 MV terminal with the development of a new system C&C.

Orion: Beams of heavy gold cluster produced by liquid metal ion source (LMIS)

The control and command system installed in the terminal.

Seen through the bottom.
The old configuration

Sun station

VX Works + conversion Cu/Op

Regonfler optic

Station

Carte Op/Cu and command interface

BitBus à 375ko/s

Cost: 60k€
8 persons
5 years

2008 Problems occurred because components became obsolete and all the designers are retired. Home made system.
The electrostatic energy accumulated on this huge "condenser" is considerable (45 kJ). This energy can be partially released or totally during a partial break of isolation, and create a damage to electronic component.

What impact the sparks will have on the operation of the PLC?
Under 8 bars of pressure of $\text{SF}_6$

Principal products of $\text{SF}_6$ decomposition observed:

- HF - hydrofluoric acid
- $\text{SO}_2$
- $\text{CO}_2$
- $\text{SOF}_2$
- $\text{CF}_4$
- $\text{SO}_2\text{F}_2$
- $\text{SiF}_4$
- $\text{S}_2\text{F}_{10}$
- $\text{SF}_4$

What impact will the decomposition have on long-term on the automaton system?
The new configuration

Supervision (Panorama) → CPU-315 → Converter Cu/Op → ET200M FO

Optical fiber

Profibus Cu 1.5MB → Profibus Op 1.5MB

Profibus à 1.5MB/s

Cost : 35 k€
4 persons
3 years

Decision to develop a new C&C based on automaton. 2011 a first successfully test.
Precautions

To address the problem of sparks. We opt for a double protections, double armor plating + Filter HF, Proven technic.

Double metallic cases with passage of bulkhead filtered HF.

Power supply on test

Slave ET200M

Communication with Optical fiber
Conclusion

The tests were carried with a potential at 14,5 MV and with the ion source in operation (ORION).

There were several sparks at 14 MV which have not affected the programmable automaton system.
Conclusions

Advantages:

- More faster
- More precision
- Less programming
- Better graphic interface
- Easy to upgrade
- More reliability?
THANK YOU