BWS-LIU
IOPS settings optimisation
03.02.2020
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LIU Beam Wire Scanner architecture

- **Position (Resolver)**
- **Power**
- **Position (Optical)**
- **Scintillator**
- **4x signal PMTs**
- **Lamp test + supplies**
- **PMT supply**
- **Intelligent drive crate (IDC)**
- **Acquisition & Supervision crate**
- **Ethernet**
- **Particle beam**
- **Losses**
IOPS interface
BWS - Analog Interfaces FMC (BWSAIF) - V4
LIU-BWS metallic disk design

TRACK CONFIGURATION

4 × Reference (omit 3 consequent slits every 90°)

40 μm

6 μm
Incremental Optical Position Sensor (IOPS)

- 10MHz
- 14 bits

- Laser power is set to saturate the upper part of the signal to ease data processing by fixing upper boundary.

- 25 pts @ 48 rad/s
- 9 pts @ 133 rad/s
IOPS interface

FW processing - RTL simulation

Transitions time stamps (low to high)
IOPS interface

Optimal laser power working point criticality

Time stamp array of slit transitions given by the FW to the SW
IOPS interface

Optimal laser power working point criticality
IOPS interface
Optimal laser power working point

1. Laser power setting
2. Laser power measured
3. Recorded time stamps
4. Scan time stamps for the optimal setting

Uses python script access to the intelligent drive to trigger scans at different laser powers.
IOPS interface

Optimal laser power working point
# IOPS interface

Optimal laser power working point

| Individual System Tests - 02.02.2021 | position | Orientation | Ring | Mechanism Asset from electronics SN | Electronic SN (EWN) | DSN | cables electronic check | control patchcord install | Dummy scanner test | scans @440 rad/s | cables length [m] | Optical encoder setting | ptc | wire check | MPMT tunnel assembly | patch cords HV*SIG | MPMT surface test | HV cables Nbr. | ADC CH1 | ADC CH2 | ADC CH3 | ADC CH4 | position |
|------------------------------------|----------|-------------|------|-------------------------------------|---------------------|-----|------------------------|------------------------|-------------------|----------------|----------------|----------------|----------------------------|-----|------------|------------------|----------------|----------------|----------------|--------|--------|--------|--------|--------|
| 411                                | H        | R1          | PXBWSRA005-0000010 | 74 | PSB_0_10 | 0 | 6 | 60 | CH1:21600, CH2:21600 | grounded | 2747325 | 411 |
| 411                                | H        | R2          | PXBWSRA005-0000007 | 71 | PSB_0_07 | 9 | 20 | 60 | - | 2747317 | 411 |
| 411                                | H        | R3          | PXBWSRA005-0000006 | 72 | PSB_0_08 | 9 | 20 | 60 | CH1:21600, CH2:21600 | ground | 2747349 | 411 |
| 411                                | H        | R4          | PXBWSRA005-0000005 | 69 | PSB_0_05 | 9 | 10 | 60 | CH1:21600, CH2:21600 | ground | 2747381 | 411 |
| 1111                               | V        | R1          | PXBWSRA005-0000004 | 68 | PSB_0_04 | 9 | 18 | 55 | CH1:21600, CH2:21600 | ground | 2747379 | 1111 |
| 1111                               | V        | R2          | PXBWSRA005-0000009 | 73 | PSB_0_09 | 9 | 14 | 55 | CH1:21600, CH2:21600 | ground | 2747385 | 1111 |
| 1111                               | V        | R3          | PXBWSRA005-0000006 | 70 | PSB_0_06 | 9 | 13 | 55 | CH1:21600, CH2:21600 | ground | 2747397 | 1111 |
| 1111                               | V        | R4          | PXBWSRA005-0000002 | 67 | PSB_0_03 | 9 | 92 ** | 55 | CH1:21600, CH2:21600 | ground | 2747409 | 1111 |
| 54                                 | H        | 1           | PXBWSRB001-0000007 | 135 | CPS_0_07 | 1 | WIRE+PTC | 30 | 185 | re-cable | 2615350 | 54 |
| 64                                 | V        | 1           | PXBWSRB001-0000004 | 132 | CPS_0_04 | 9 | 20 | 220 | - | 2600675 | 64 |
| 65                                 | H        | 1           | PXBWSRB001-0000003 | 133 | CPS_0_05 | 9 | 10 | 222 | check settings | - | 2600889 | 65 |
| 68                                 | H        | 1           | PXBWSRB001-0000006 | 134 | CPS_0_06 | 9 | 10 | 213 | check settings | - | 2600760 | 68 |
| 85                                 | V        | 1           | PXBWSRB001-0000003 | 131 | CPS_0_03 | 9 | 30 | 218 | - | 2600858 | 85 |
| 41677                              | V        | 1           | PXBWSRC006-0000001 | 122 | CPS_0_01 | 9 | 20 | - | low signal from disk | GND | 3400222 | 41677 |
| 41678                              | V        | 1           | PXBWSRC006-0000004 | 196 | CPS_0_05 | 9 | 30 | - | - | 3400237 | 41678 |
| 51038                              | H        | 1           | PXBWSRC006-0000001 | 198 | CPS_0_01 | 9 | 170 ** | - | - | 3501721 | 51038 |
| 51639                              | H        | 1           | PXBWSRC006-0000003 | 105 | CPS_0_03 | 9 | 101 | - | - | 3501740 | 51639 |
Summary

• IOPS setting optimization is part of the hardware IST today
• Performed using direct ethernet access to HW with Python script
• Needed every time we change hardware (tunnel or surface)
• Good tool for survey of the IOPS sensor stability (tunnel & optoelectronics)
• To discuss where this functionality should be located for the future:

  (Python expert tool, FESA Expert class, Expert tools for IST)