MTV DUMMY 15

Development Status 2012_11_22

Slides on mechanics development on behalf of D.Gerard
Optics/Screen: S.Burger

Paramètres (1/2)

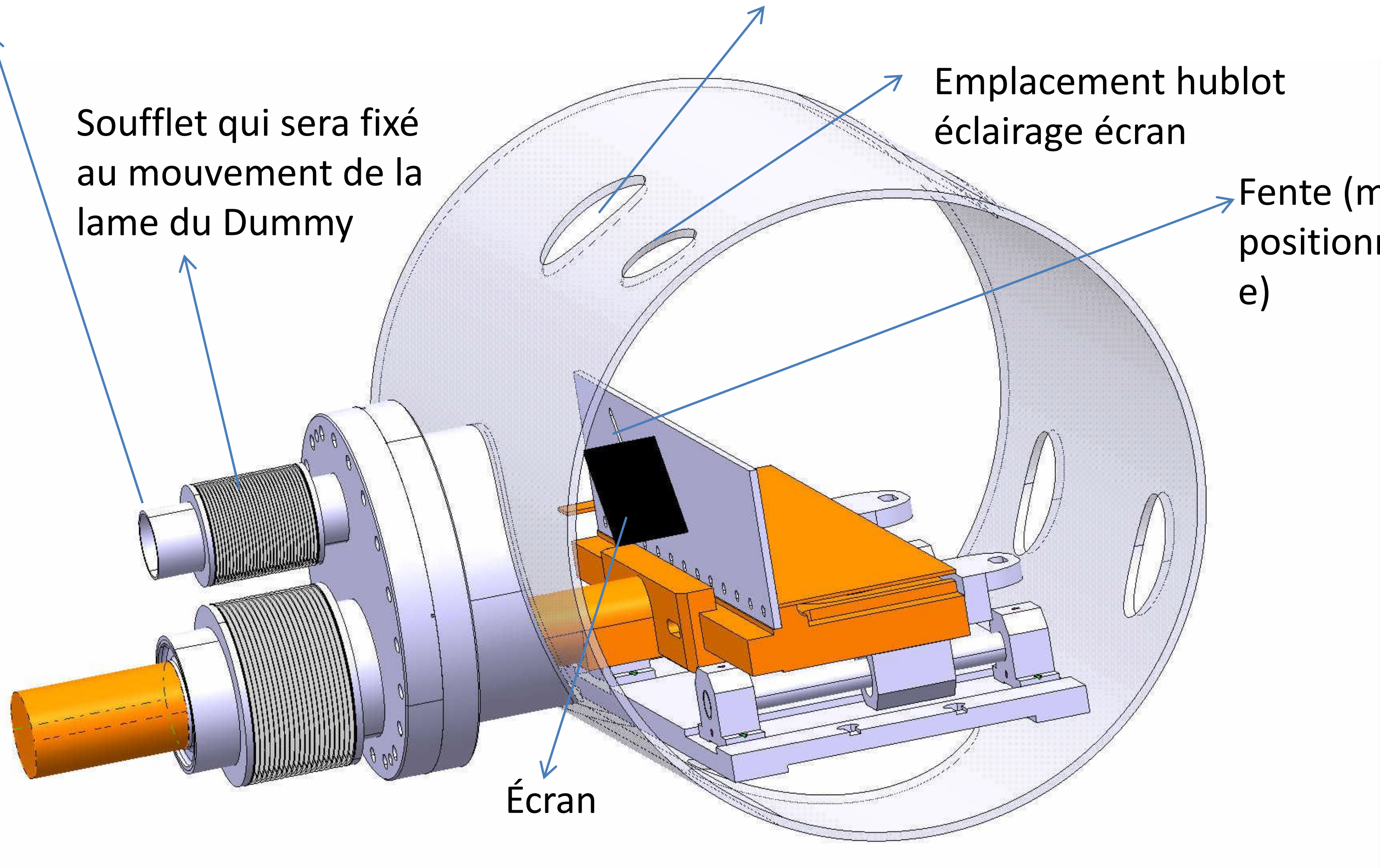
➢ Mouvement IN/OUT:

- ❑ Pneumatique, relié au mouvement de la lame
- ❑ Position IN contre la projection de la lame (=> fente au niveau de la lame pour ne pas avoir de contact direct avec celle-ci)
- ❑ Course réelle entre 45 et 50 mm (à définir lors du design)

➢ Intégration sur le tank:

- ❑ Position parking de l’écran
- ❑ Hublot: éclairage et visualisation écran
  - ❑ 2 hublots si on separe les fonctions (2x DN63)
  - ❑ 1 seul + grand est possible (DN100)
- ❑ Bride pour le mouvement ecran reliée au mouvement de la lame
- ❑ Prevoir fixation système camera et commande pneumatique

draft


Bride sur laquelle le mouvement in/out sera placé
Soufflet qui sera fixé au mouvement de la lame du Dummy
Emplacement hublot visualisation ecran
Emplacement hublot éclairage écran
Fente (mal positionnée)
Écran

Statut

- En cours au BE

- Planning:
- Design au plus tard fin janvier 2013
- Livraison fabrication fin avril 2013
- Assemblage fin mai 2013

MTV DUMMY 15 SCREEN

- **Constraints:**
  - High level of radiation environment
  - Reliable system (minimize maintenance)

- Choice of screen linked to type of detector (camera: CCD or radiation hard camera)

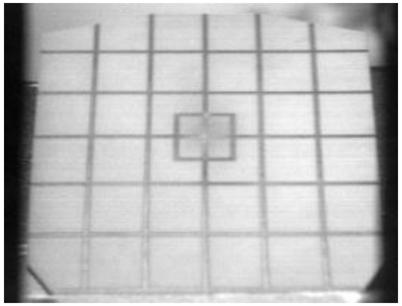
- The choice for a **Alumina screen (Al_2O_3)** has been.
  - Robust
  - ‘Self holding’ screen which permits to be closer (even inside) the blade to get all the beam sweeping from circulation to extraction passage
  - Good efficiency for use with Vidicon tube camera (low sensitivity but radiation tolerant detector)

Optical/Magnification Test BTV @ Septum Dummy_15

S.Burger 2012_10_19

AIM: Check the optics/magnification we would get using the RAD hard camera (Vidicon) with a focal 50mm objective (radiation hard).

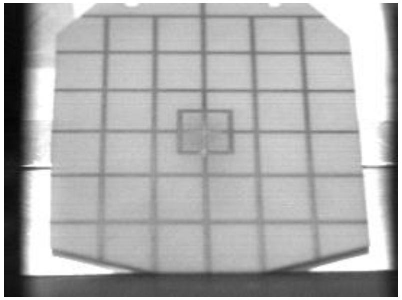
To see 40mmx40mm (to be confirmed) area taken by the screen (projected view) + some room for any movement of the system (blade + screen itself) + some margin, this means **total area of 60x60mm2**, we end up with the following:



(Setup already includes the 45 degres tilt of the screen)

- No depth of field issue
- Mean calibrations gives

  H_{cal} = 235um/pixel **V_{cal} = 315um/pixel**
- Distance between middle of screen and objective is 36cm
- Taking into account all these numbers above, DN63 as optical aperture is enough, even though DN100 could be used as a single viewport instead of 2 for optical passage **AND** calibration lights… To be discussed.



- Example image with distance screen/objective of 45cm

  Mean calibrations gives

  H_{cal} = 284um/pixel **V_{cal} = 337um/pixel**

Alumina Saturation test in TT2 (1/2)

Motivation

Check whether any saturation effect occurs from the screen itself with such a intense beam (1 to 4E13p)

Test Setup

A test has been performed in TT2 using FT16.MTV241. This instruments is already equipped with the following filters :

- OD0.3 (T=50%)
- OD0.7(T=20%)
- OD1 (T=10%)

They have been installed for use with OTR screens. They are not attenuating enough when observing beam on alumina screen → **Need a filter wheel!**

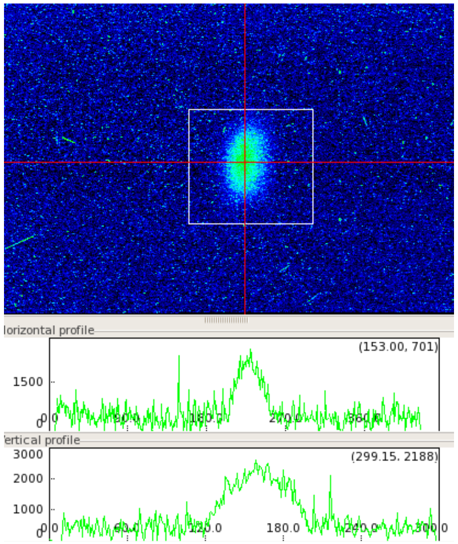
A second filter system is then needed to avoid saturation of the detector. Comparing OTR measurement with saturated image from the Al2O3 screen we could estimate (knowing the sigma) the amplitude this image would have had if not saturated. Taken into account the large error of such an estimate, we ended up with the following filter to add to the existing ones:

- OD4 (T=0.01%)
- OD5 (T=0.001%)
- OD6 (T=0.0001%)

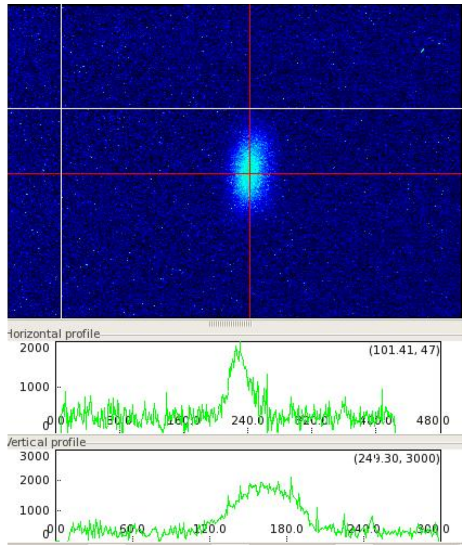
Alumina Saturation test in TT2 (2/2)

Results

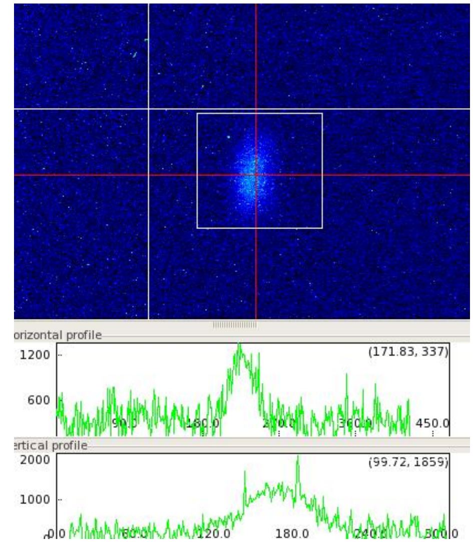
Example images and profiles



2.2E13 protons on Al2O3 screen with OD6 filter



2.2E13 protons on Al screen with OD0.3 filter



2.2E13 protons on Ti screen without filter

Measurements

Intensity	Screen	Filter transmission	Horizintal Sigma	Vertical Sigma
xE13 p		*[%]*	*[px]*	*[px]*
2.2	Al2O3	1.00E-06	13.01	22.49
2.2	Al2O3	1.00E-06	12.74	23.35
2.2	Aluminium	50	12.12	23.94
2.2	Aluminium	50	12.17	23.96
2.2	Titanium	100	11.99	23.33
2.2	Titanium	100	11.84	23.69

Max Δ_H is 10%

Max Δ_V is 6%

→ Beam difference

→ Thickness Al2O3 screen

→ We can conclude there is no saturation effect from the screen itself.