



United States  
Burning Plasma Organization

# Progress and Plans of the US Burning Plasma Organization

James W. Van Dam

*USBPO*

# USBPO Role in ITER Support

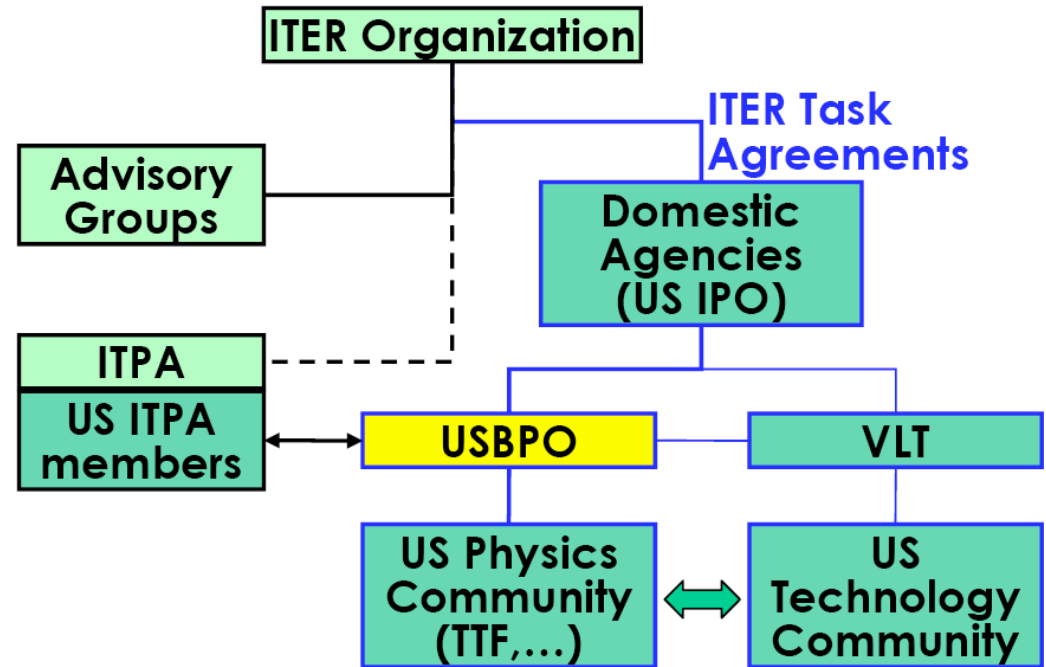


- **US ITER Project Office**

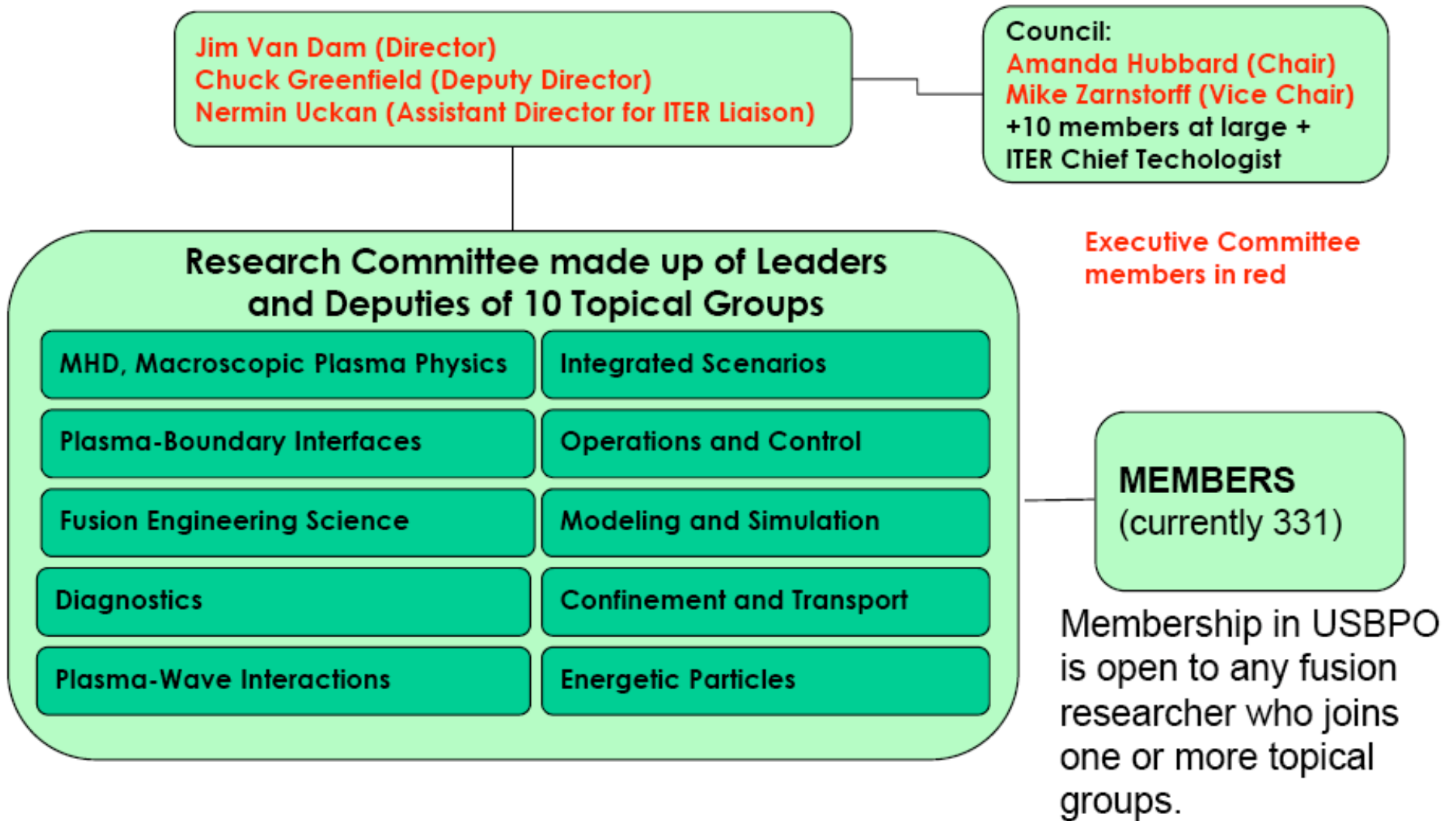
- Main link to ITER
- Provides hardware & technical contributions

- **USBPO**

- Coordinates US burning plasma research, to advance scientific understanding & ensure greatest benefit from ITER
- USBPO director is also USIPO chief scientist



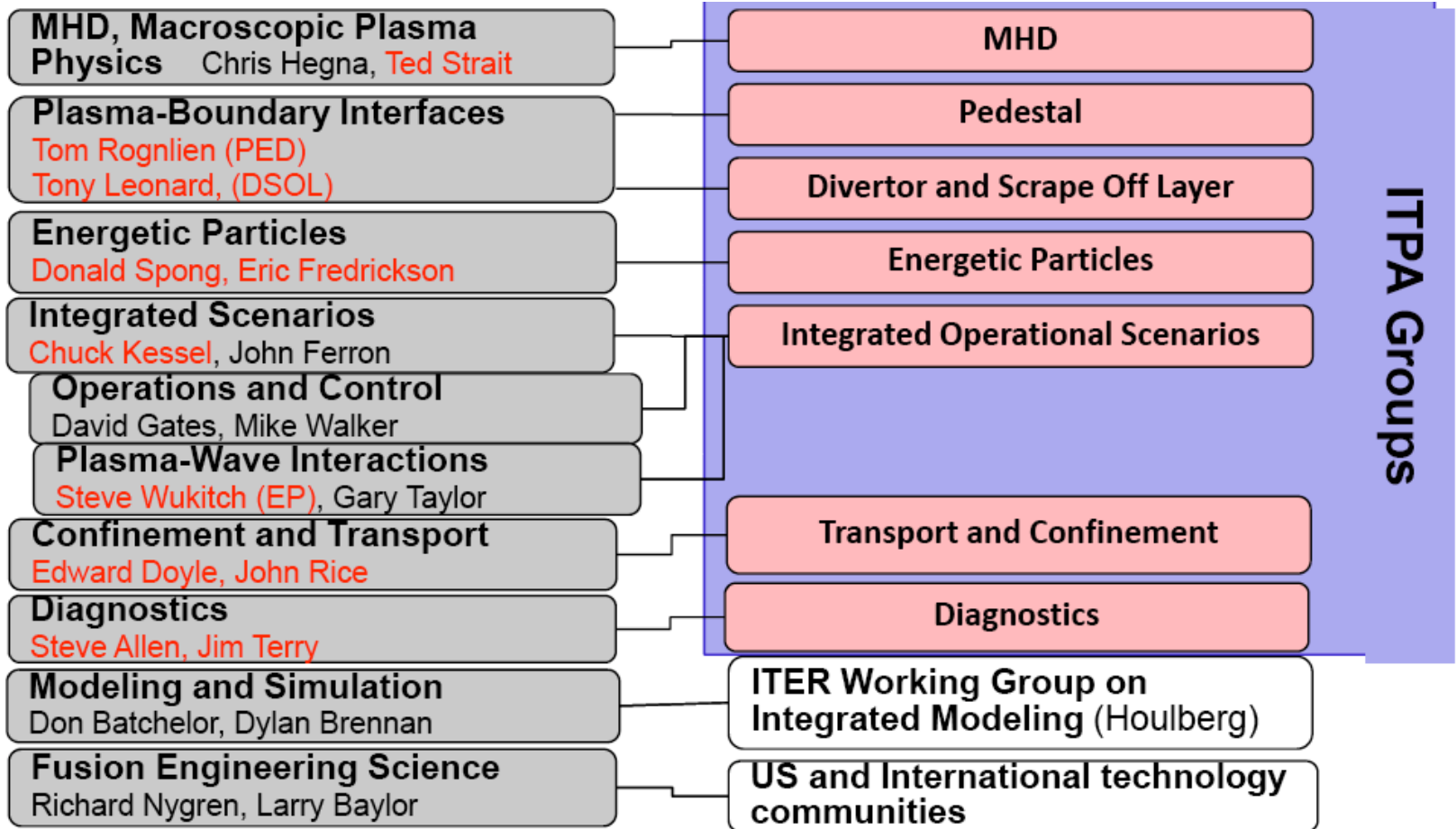
# Broad Expertise of USBPO Topical Groups



# Strong Links to ITPA/ITER Topical Groups



US BPO Topical Groups  
and leaders  
(ITPA members)



# Enhanced USBPO-ITPA Connections

---



- **Regular joint meetings**
  - Since Nov 2009 (DPP), every other Research Comm meeting is joint with US ITPA topical group coordinators
  - Publicize ITPA meetings; reports in eNews; new page on web site
- **IEA/ITPA Joint Experiments Planning Meeting**
  - USBPO participated (MIT, Dec 2008 & Daejeon, Dec 2009)
  - Research Comm discussing how to contribute to T&C and Div/SOL “test case” joint modeling activities
- **Boundary-Plasma Interfaces topical group**
  - Two focus subgroups formed—Pedestal & Divertor/SOL—to streamline alignment with ITPA structure
  - TG name changed to “Pedestal and Divertor/SOL Topical Group”

# ITER Physics Task Agreements

---



- **ITER issued solicitations for new Tasks in 2009**
  - 18 issued so far, most for 12-month duration
  - Sent to Domestic Agencies (technical specs, deliverables, schedule)
  - Circulated to US fusion community by USBPO (email, web posting, eNews)
  - Proposals assessed by USIPO (with comments from USBPO) and sent to ITER for its decision
    - Evaluation of the allocation of tasks based on cost, schedule, and technical capability, including satisfaction of the technical requirements
  - Set up as task agreement between ITER and US Domestic Agency (IPO)
- **Results so far**
  - US proposals were submitted for 15 of 18 Tasks, and have been accepted for about half (8) of the Tasks
  - A few Tasks have been awarded to more than one Domestic Agency

# USBPO Planning-related Activities

---



- **NAS/NRC review of EAct Report**
  - CRISPPP committee report published in early 2009
- **Updated planning on US participation in ITER**
  - Report of “Marmar Committee” of USBPO Council (Sept 2009)
- **Research Needs Workshop (ReNeW for Magnetic Conf)**
  - Strong involvement by USBPO members (16 of 22 RC, 10 of 12 Council)
  - ReNeW web site hosted by USBPO
- **US participation on ITER advisory groups**
  - ITER Research Plan Work Group (5), TBM Program Committee (4), Integrated Modeling Expert Group (2), STAC (5), MAC (5)

# Communication & Outreach

---



- **IT capabilities (@U. Wisconsin)**
  - USBPO web site; video conferencing; file sharing; archiving
  - Remote seminar “LH Capabilities for ITER” (Feb 2009)
- **Activities at APS-DPP Meeting**
  - Contributed oral session on ITER-related research
    - 2008 and 2009 (14 speakers, ~150 attendance including ITER scientists)
    - Requests for oral slots > supply → go to 2 sessions?
  - Evening Town Meeting on ITER
    - 2008 (3 speakers including ITER, ~75 attendance)
- **USBPO *eNews***
  - 480 subscribers (from 95 institutions); Jan 2010 *eNews* was 40<sup>th</sup> issue
  - Initiated a new regular feature: Research Highlights articles

# Plans: ITER R&D issues

---



- **ITER urgent R&D issues**
  - List published at STAC meetings and 2008 ITPA Joint Experiments Mtg
  - ITPA topical groups addressed these in planning 2009 & 2010 activities
  
- **Issue: Test Blanket Modules for ITER**
  - ITER Council established TBM Program Committee (4 US members)
  - US involved in TBM program (but will not put a TBM on ITER)
  - USBPO formed special task group on TBMs
  - TBM simulation experiments on DIII-D in late November
    - International team (including 4 US non-GA scientists): 12 members on site from 5 of 7 ITER Members
    - Explored effect on confinement, rotation, H-mode access, fast ion loss, etc.
    - Results to be reported at IAEA-FEC, EPS, and APS-DPP meetings
  - ITER organizing a TBM Workshop (Apr 13-15)
    - Briefings for US participants (before) and US STAC members (after)

# Plans: More ITER R&D issues

---



- **Issue: ELM mitigation for ITER**
  - US has led team to design in-vessel RMP coils for ITER
  - Pressure on ITER to explore alternative control methods
    - Community “brainstorming session” videoconference (late March)
- **Issue: Tritium retention for ITER**
  - US participated in meeting sponsored by EU task group on tungsten divertors for ITER
- **ITER plasma control workshop (Dec 2009)**
- **STAC-8 Meeting (May 10-12)**
  - USBPO participation
  - Preparatory briefing(s)

# Plans: National & International

---



- **Burning plasmas at major meetings**
  - 2010 IAEA-FEC: Helping to review burning plasma papers (US & IO)
  - 2010 APS-DPP: Will plan burning plasma/ITER events again this year
  
- **Burning plasma-related international collaborations**
  - New USBPO working group (Zarnstorff): separate BPM talk
  - Proposal to work with EFDA topical groups (March 16)
  - Discussions with Japanese colleagues (March 24)
  - Advisory committees: NIFS (Japan), NFRI (Korea), IFTS (China), PSSC (Taiwan), IPP (Germany), US major facilities, Fusion Simulation Project
  
- **ITPA ongoing activities**
  - Encourage US program involvement via participation at Topical Group meetings and in Joint Experiments

# Plans: Other Activities

---




- **Coordination with other US groups**
  - Exploring links with Transport Task Force, Theory Coordinating Committee, Edge Coordinating Committee
  - Participate in FSP program advisory committee, Fusion Facilities Coordinating Committee
  - Continue as scientific arm of the US ITER Project Office
  
- **Information access**
  - All USBPO presentations, white papers, progress reports, etc., posted on web site
    - Example: USBPO talk at Fusion Power Associates Meeting (Dec 2009)
  - *eNews* issues present and past
  - ITPA info page, ReNeW archive, fusion calendar
  - US STAC members web page (password)

# Plans: ITER Summer School




- **4<sup>th</sup> ITER International Summer School to be held in US**
  - May 31-June 4, U of Texas campus
  - Sponsors: USBPO, Nat'l Instruments
  - Previous IISS held in France (2007, 2009) and Japan (2008)
- **Theme this year:**
  - *MHD and Plasma Control in Magnetic Fusion Devices*
- **Participation**
  - Plan for 20 lecturers, 100 students
  - Registration deadline **April 30**



**IISS 2010**  
4<sup>th</sup> ITER International Summer School  
"Magnetohydrodynamics and Plasma Control  
in Magnetic Fusion Devices"  
31 May - 4 June 2010  
The University of Texas at Austin



Sadruddin Benkadda  
Director, IISS  
Université de Provence



David Campbell  
Chair, IISS Scientific Committee  
ITER



Wendell Horton  
Joint Director, IISS 2010  
Chair, Local Organizing Committee  
The University of Texas at Austin

<http://w3fusion.ph.utexas.edu/ifs/iiss2010/>



# USBPO is a team effort

---



- **Large effort**

- Membership (316 from 55 institutions + 15 non-US Associate Members from 9 institutions)
  - Easy on-line joining procedure ([www.burningplasma.org](http://www.burningplasma.org))
- Council (12 members), Research Committee (20), Directorate (5)
  - Annual rotation (1/3 Council; up to 1/2 TG leaders)
  - Please vote in upcoming Council election
- ITPA (from US, 49 Topical Group members + 3 Coordinating Committee members)

- **Dedicated effort**

- Service to US fusion community as we enter “Burning Plasma Era”

# SUPPLEMENTAL SLIDES

---



# USBPO Council Members (2009-10)



Council Member	Institution
Amanda Hubbard – Chair	MIT
Michael Zarnstorff – Vice Chair	PPPL
Michael Bell	PPPL
Lee Berry	ORNL
C. S. Chang	NYU
Martin Greenwald	MIT
Michael Mauel	Columbia
Wayne Meier	LLNL
John Sarff	Wisconsin
Phil Snyder	GA
Tony Taylor	GA
Mike Ulrickson	Sandia
Stan Milora (VLT), Erol Oktay, Jim Van Dam	Ex officio

# USBPO Topical Group Leaders (2009-10)



Topical Group	Leader	Deputy Leader
Confinement & Transport	Edward Doyle (UCLA)	John Rice (MIT)
Diagnostics	Steve Allen (LLNL)	Jim Terry (MIT)
Energetic Particles	Don Spong (ORNL)	Eric Fredrickson (PPPL)
Fusion Engineering Science	Richard Nygren (SNL)	Larry Baylor (ORNL)
Integrated Scenarios	Chuck Kessel (PPPL)	John Ferron (GA)
MHD	Chris Hegna (Wisc)	Ted Strait (GA)
Modeling & Simulation	Don Batchelor (ORNL)	Dylan Brennan (Tulsa)
Operations & Control	David Gates (PPPL)	Michael Walker (GA)
Pedestal & Divertor/SOL	Tom Rognlien (LLNL)	Tony Leonard (GA)
Plasma-Wave Interactions	Steve Wukitch (MIT)	Gary Taylor (PPPL)

# US ITPA Topical Group Coordinators



Topical Group	US Coordinator	US Deputy Coordinator
Diagnostics	Rejean Boivin [1]	Jim Terry
Divertor & SOL	Bruce Lipschultz [1]	Tony Leonard
Energetic Particles	Raffi Nazikian	Boris Breizman
Integrated Operation Scenarios	Chuck Kessel	Tim Luce
MHD Stability	Ted Strait [2]	Bob Granetz
Pedestal	Phil Snyder	Rajesh Maingi
Transport & Confinement	Stan Kaye [1]	George McKee
*****	*****	*****
Coordinating Committee	Ron Stambaugh (chair)	Erol Oktay, Jim Van Dam

[1] Also: Topical Group international leader

[2] Also: Topical Group international deputy leader

# ITER Physics Tasks – 1



Task name	ITER due date	ITER status
Study of Error Fields Using Ideal Perturbed Equilibrium Code	27 Mar 2009	US (exclusive)
Study of Control of Plasma Current, Position and Shape	23 April 2009	US (Task 1) & EU
Self Consistent Simulations of Plasma Scenarios	23 April 2009	US
Benchmarking and update of TSC codes and simulations of ITER disruptions/VDEs scenarios	2 July 2009	US
Task on the Error Fields Measurements without Plasma	20 May 2009	US
Task on the Error Fields Measurements using plasma response	9 June 2009	US
Task for Self-consistent Transport Simulations of Plasma Scenarios with Fixed-Boundary Equilibria	24 July 2009	US

# ITER Physics Tasks – 2



Task name	USIPO due date	ITER status
Task for edge magnetic field structure for ELM control in ITER and associated power/particle fluxes to plasma-facing components	17 Sept 2009	US
Study of Plasma Start-up	2 May 2009	EU
Task on magnetic reconstruction of the plasma boundary	20 June 2009	EU
Task on analysis of Resistive Wall Mode control by in-vessel (RMP) coils	20 June 2009	EU
H&CD Physics Assessments by Updated F3D OFMC and ACCOME Codes	11 Sept 2009	RF and JA
Simulations of runaway electrons in ITER	12 Sept 2009	
Task on Simulations of Toroidal Field Ripple and TBM Effects on Energetic Particle Losses in ITER	20 June 2009	JA

# ITER Physics Tasks – 3



Task name	USIPO due date	ITER status
Preparation of design database with the updated disruption code DINA	20 May 2009	JA
Nominations for Explosion Risk Analysis in support of completing the ITER RPrS	6 April 2009	
Magnet safety and reliability studies - Feeder Fault Scenario Analysis	14 April 2009	
Blanket First Wall independent surface shaping verification	15 Feb 2010	Under evaluation