EDICAM Session - Introduction

E. Belonohy

EUROfusion EU Naka-site Coordination Team

WPSA Annual Planning VC Meeting

JT-60SA
Advanced Superconducting Tokamak
BA-Satellite Tokamak Program

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Introduction

EDICAM – first and only EU diagnostic installed on JT-60SA in the Integrated Commissioning Phase 2020-21.

Experience with EDICAM provided great learning opportunity for future enhancement projects.

Session Outline:

- **Introduction (E. Belonohy)**
- **EDICAM capabilities (T. Szepesi)**
- **Use of EDICAM in the IC phase (T. Szepesi)**
- **Use of 3D CAD models (T. Lunt)**
- **Discussion (E. Belonohy)**

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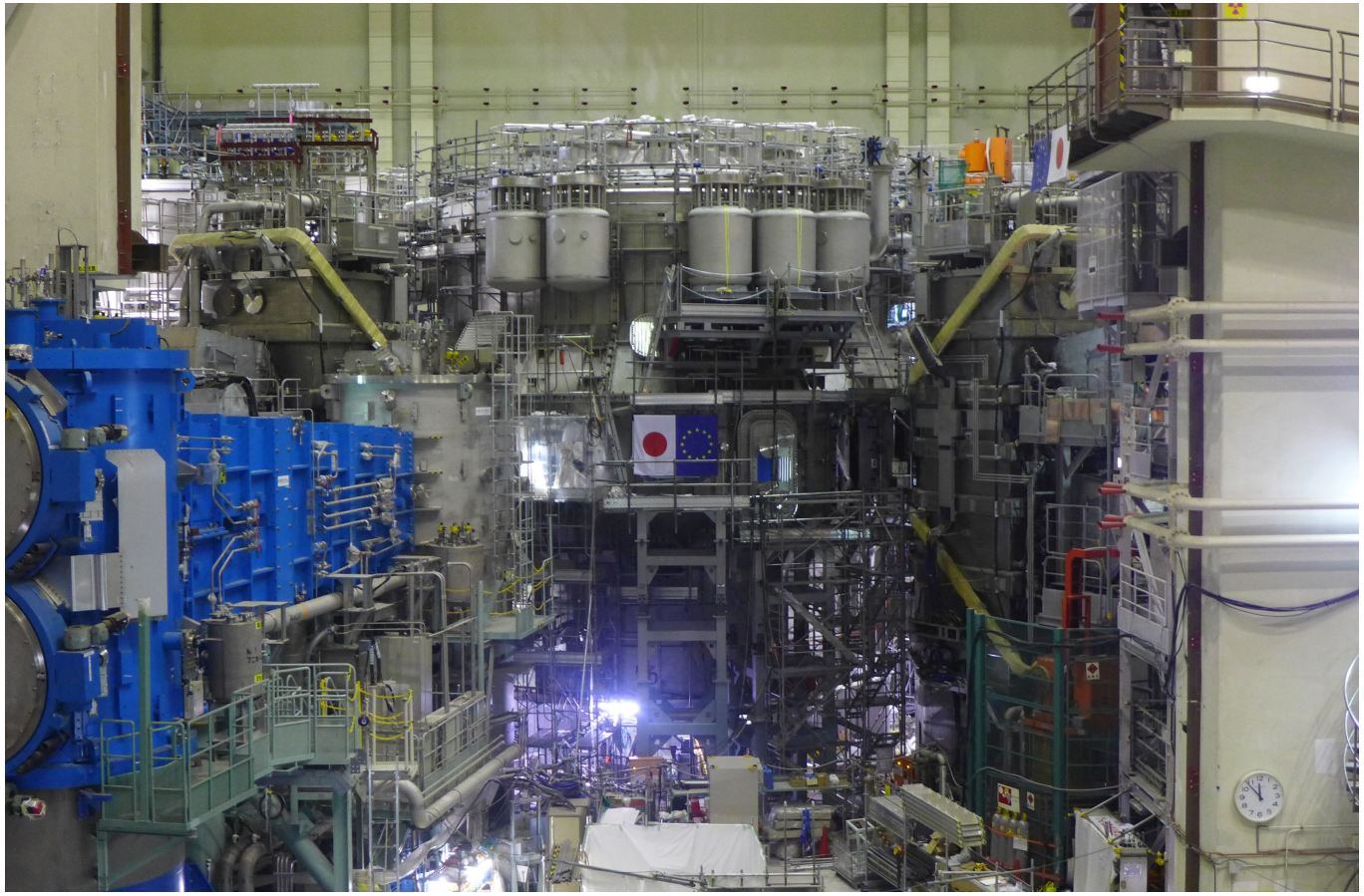
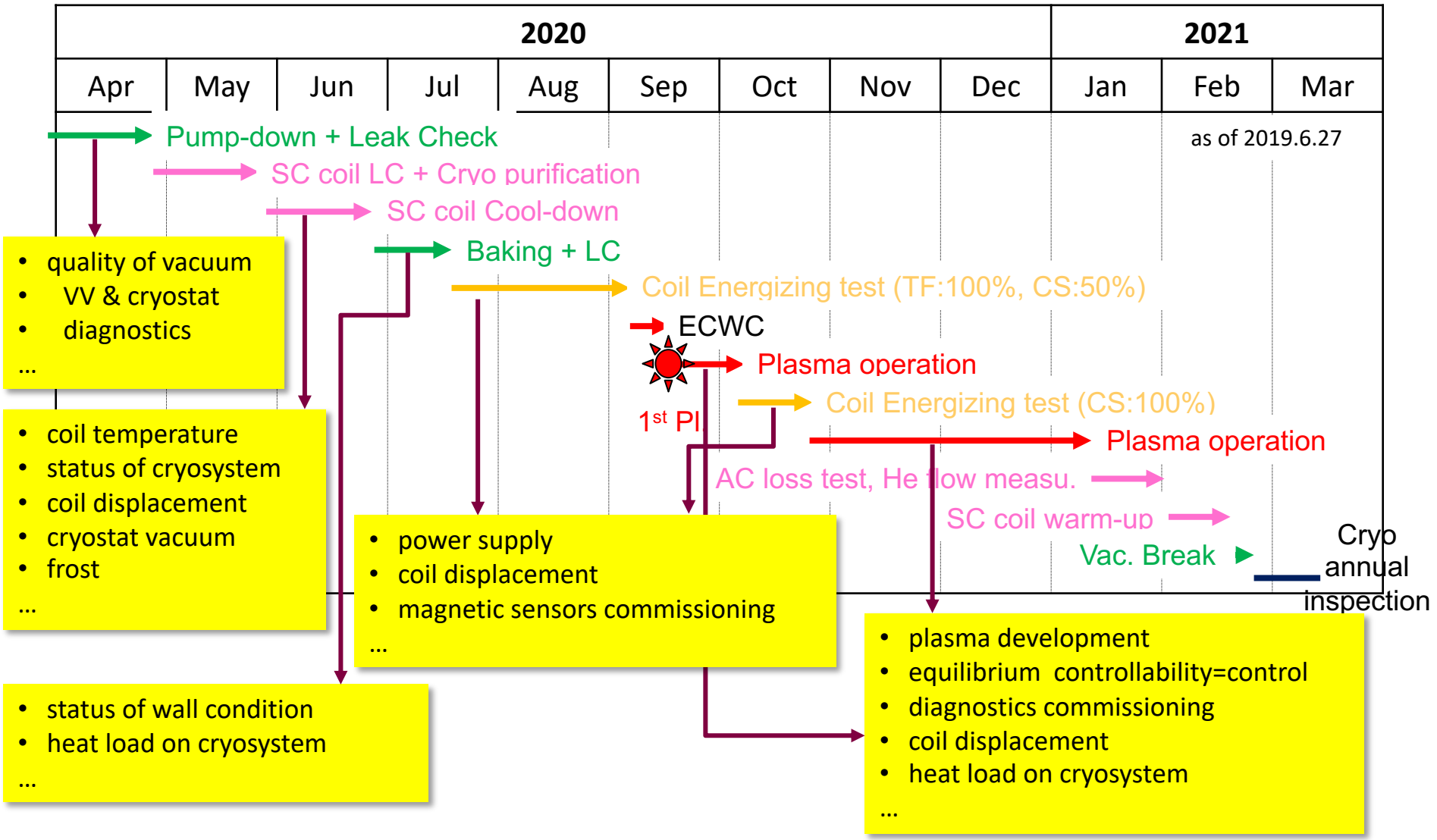
JT-60SA status



The construction phase completed on 31st March 2020 according to plan.

Integrated Commissioning Timeline



EU EDICAM team in the IC 2020-21

Competence	IC team on site	weeks on-site/off-site	Supporting / on-call visiting expert	weeks on-site/off site	Home support experts	Weeks (off-site)
Breakdown	D. Ricci (ENEA) W. Bin (ENEA)	12/6 8/4	A.Lunt (IPP) B. C. Sozzi (ENEA)	4/1 2/2	.Moro (ENEA)	4
ECWC + gas	T. Wauters (ERM)	13/4	C. Sozzi (ENEA)	2/2	J. Buermans (ERM)	10
Control and equilibrium	D. Abate (ENEA) M. Bonotto (ENEA)	12/12 12/12	M. Mattei (ENEA) A. Pironti (ENEA)	2/4 2/2	M. Ariola (ENEA) L. Di Grazia (ENEA) M. Adriano (ENEA) G. Tartaglione (ENEA)	2 16 4 4
Cryo and magnets	A.Louzguiti (EEG, CEA) F. Michel (CEA)	16/20 14/2	L. Zani (CEA), C. Hoa (CEA)	6/10 4/3	B. Lacroix (CEA) A.Torre (CEA) S. Nicollet (CEA) P. Roussel (CEA) R. Bonifetto (ENEA)	4 4 8 4 4
EDICAM	T. Szepesi (Wigner) G. Kocsis (Wigner)	12/4 12/5	S. Zoletnik (Wigner) O. Asztalos (Wigner) T. Szabolics (Wigner) A. Kovacsik (Wigner)	4/2 6/0 4/2 4/0	Possible support within WPSA	
Magnetic and MHD	L. Pigatto (EEG, ENEA)	16/8	T. Bolzonella (ENEA) F. Villone (ENEA)	6/4 2/4	G. Rubinacci (ENEA) C. Reux (CEA) V. Scalera (ENEA) N. Isernia	4 3 6 6
Scenario development	M. Iafrati (ENEA)	20/10	S. Hall (CCFE), P. Moreau (CEA)	4/1 4/0	Possible support from WPSA	
	Under QST management	147/87	Visits managed by EJ/ EB/GdeT	48/37		73

EU EDICAM team in the IC 2020-21

			SC coil								Baking			Coil Energisation					ECWC		First plasma		Coil Energ.			Plasma Operations														AC loss test								
Surname	**First Name**	**Selected competence: 1**	04/05/20	11/05/20	18/05/20	25/05/20	01/06/20	08/06/20	15/06/20	22/06/20	29/06/20	06/07/20	13/07/20	20/07/20	27/07/20	03/08/20	10/08/20	17/08/20	24/08/20	31/08/20	07/09/20	14/09/20	21/09/20	28/09/20	05/10/20	12/10/20	19/10/20	26/10/20	02/11/20	09/11/20	16/11/20	23/10/20	30/11/20	07/12/20	14/12/20	21/12/20	28/12/20	04/01/21	11/01/21	18/01/21	25/01/21	01/02/21	08/02/21	15/02/21	22/02/21
Asztalos	Ors	EDICAM																																1	1	1	1	1	1						
Kocsis	Gabor	EDICAM																	1	1	1	1	1	1							1	1	1	1	1	1									
Kovacsik	Akos	EDICAM																	1	1	1	1																								
Szabolics	Tamas	EDICAM																	1	1	1	1																								
Szepesi	Tamas	EDICAM																	1	1	1	1					1	1	1	1							1	1	1	1						
Zoletnik	Sandor	EDICAM																							1	1	1	1																		
Lunt	Alexander	Breakdown																					1	1	1	1																				
TOTAL per week			0	1	2	2	5	5	5	5	5	5	5	5	5	6	6	8	11	11	11	11	9	9	8	8	8	11	9	9	8	7	8	8	7	7	6	8	9	10	10	6	6	4	3

2-shift operation of JT-60SA in the Integrated Commissioning Phase

EK (previously Wigner) group covers

- **Start up of the diagnostic with 4 people**
- **the plasma operation phase with 1-2 people**

Impact of the corona virus

- **Monitor coronavirus situation for travel restrictions**
- **Discuss alternative plan for increased support from EU**

Contact people

	F4E project leader	Deputy Project Leader and Naka-site representative
F4E JT-60SA project	E. Di Pietro	S. Davis
Topic	**EUROfusion contact**	**Japan contact**
Preparation for Experiment Implementation Organization	E. Joffrin (E. Belonohy, G. de Tommasi)	S. Ide, (T. Suzuki, M. Yoshida)
Plasma Operation Team	E. Belonohy, G. de Tommasi	M. Yoshida
Plasma discharge development	E. Belonohy	*M. Yoshida (H. Urano)*
Plasma breakdown	G. De Tommasi	*H. Urano (T. Wakatsuki)*
Plasma control and equilibrium	G. De Tommasi	*S. Inoue (T. Wakatsuki)*
ECWC and gas analysis	E. Belonohy	*T. Nakano (M. Fukumoto)*
MHD and disruption	G. De Tommasi	*M. Takechi (H. Tojo)*
EDICAM	E. Belonohy	K. Kamiya
Cryogenics and magnets	E. Joffrin	K. Hamada
Remote data access	G. De Tommasi	

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Useful documents for Integrated Commissioning

Research plan: www.jt60sa.org/pdfs/JT-60SA_Res_Plan.pdf

WPSA wiki:
http://users.eurofusion.org/iterphysicswiki/index.php/WPSA:_Preparation_of_Exploitation_of_JT-60SA

CQMS:
https://users.jt60sa.org/IDM/Pages/DocumentSystem.aspx?uid=228V87

Plant Integration Document (PID):
https://users.jt60sa.org/?uid=222UJY

Aim of this session / Discussion

- **Understand the capabilities of the EDICAM system**
- **The use of the EDICAM system in the Integrated Commissioning Phase**
- **Analysis tools – available and planned**
- **Work plan for 2020-21**
- **Requested support, data access and information in 2020**
- **Strategy during the coronavirus**

Use of EDICAM for breakdown studies

G. de Tommasi

- Camera images at a **high time resolution** are essential to monitor the breakdown scenario, with or without ECRH → definition of the ROI where the plasma is expected to form

- Acquired images would be used to to estimate where the plasma will form
  - to give indication to the team the will develop the breakdown scenario during IC
  - to perform model validation

- The first 100 ms of the discharge are of interest, **possibly to be acquired at the maximum time resolution (1 kHz → to confirm)**
  - more specifically, at least the first 20-30 ms should be acquired at the maximum rate, to study the formation of the resonance layer and the plasma tube, its vertical extension and speed, at maximum temporal resolution