

## UK/US Quad Suspension Milestones: Planned and Needed Dates

Old version history at end.

Version 7 Feb 21 2007. Following SUS meeting. Changes marked. Dates and sequencing of 1.44 to 1.48 need further work once the LASTI test plan is firmer (NAR is writing it) and we have confirmed the ring heater philosophy (RODA; Willems to draft).

Interested parties: Ian Wilmut; Bob Taylor; Peter Fritschel; Phil Willems; Dennis Coyne; Dave Ottaway; Helena Armandula; Tim Hayler; Janeen Romie; Ken Mailand; Garilyn Billingsley; Stuart Aston; Ken Strain; Carol Wilkinson; Mike Smith; Russell Jones; Mark Barton; Norna Robertson.

	UK Rep.	US Rep.	Planned	Needed
<b>1. NOISE PROTOTYPE</b>				
1.1 US delivers LIGO 1 OSEMs (dirty) to RAL for trial assembly	Wilmut	Taylor	DONE 01-dec-06	n/a
1.2 US delivers LIGO 1 OSEMs (clean) to LASTI for real assembly incl spares	Wilmut	Taylor	DONE 10 Jan 07	5 April 07
1.3 US delivers final formal agreement info on mass and size of comp plate	Wilmut	Fritschel (RODA)	DONE 21 Feb 2007	n/a
1.4 US delivers agreement on TM ring heater interface	Wilmut	Willems	DONE 01 dec 06	20-Sep-06
1.5 US delivers agreement on Comp plate ring heater interface	Wilmut/O'Dell	Willems	Not needed	n/a
1.6 US specifies location of wiring interface point on seismic table	Aston	Coyne/Romie	???	15 March
1.7 UK delivers ear bonding jig to Glasgow (Internal SUS UK --> SUS UK)	Wilmut	UK only	Done 10 Feb 07	30 jan 07
1.8 UK delivers details of baffle interface from UK side	Wilmut	Smith	DONE 01 dec 06	n/a
1.9 UK delivers first reaction mass for plating	Glasgow	Armandula	10 Mar 07	10 Mar 07
1.10 UK delivers mask design	Jones	Armandula	DONE 01 dec 06	n/a
1.11 US delivers plated reaction mass ready for prisms bonding (Internal SUS US --> SUS US)	Glasgow	Armandula	10 Apr 07	???
1.12 UK delivers other parts ready for ear bonding: bonding jig, PU mass, ears to LASTI	Wilmut+ Glasgow	Armandula	1 May 07	1 May 07
1.13 US (with UK support) delivers masses (TM, PU, RM) with bonded ears/prisms at LASTI	Glasgow	Armandula	7 June 07	7 jun 07
1.14 UK delivers parts for testing	Wilmut	Taylor	30 Mar 07	30 Mar 07
1.15 US delivers tested parts to LASTI	N/A	Armandula / Taylor	15 Apr 07	15 Apr 07
1.16 UK delivers cleaned parts (structure, metal masses) to LASTI	Wilmut/Hayler	Ottaway	2 April 07	2 April 07
1.17 UK delivers clean assembly tooling to LASTI	Wilmut/Hayler	Ottaway	2 April 07	2 April 07

	<b>UK Rep.</b>	<b>US Rep.</b>	<b>Planned</b>	<b>Needed</b>
1.18 US delivers Caltech gazebo (may need to be modified)	Wilmot	Romie	16 mar 2007	2 April 07
1.19 US delivers working area on bench in clean room for assembling masses	Wilmot	Romie/ Ottaway	2 April 07	2 April 07
1.19 a UK delivers lower structure to Caltech for fit checks with 5 axis table	Wilmot	Mailand	5 Mar 07	5 Mar 07
1.20 US delivers 5 axis table (Mailand)	Wilmot	Mailand	2 April 07	2 April 07
1.21 US delivers ergo arm ready for “glass” masses with flats to LASTI	Wilmot	Armandula	28 feb 07	2 April 07 (trial with metal masses)
1.22 US delivers modified end for ERGO arm to accept metal masses	Wilmot	Armandula	2 April	2 April 07
1.23 US delivers scissor table and Genie	Wilmot	Mailand/Ottaway	2 April	2 April 07
1.24 US carries out final anti-creep treatment on loaded blades (120C, 1 week, Ar/vacuum or maybe in air)	Wilmot	Mason/Ottaway	TBD once requirements clear	~20 April 07
1.25 US delivers installation tooling (conveyor and elevator)	Wilmot	Mailand	30 April 07	30-Apr-07
1.26 US delivers room at LASTI for laser welding with optics table, services, laser safety, and space for ribbon testing and characterisation and ear bonding and for unpacking masses	Glasgow/ Wilmot	Ottaway	1 May 07	1 May 07
1.27 (Internal SUS UK --> SUS UK) Glasgow delivers details of ribbon stress-relief stretch and overload distance to RAL (allows manufacture of packing pieces).	Wilmot/Jones	UK only	2 Apr 07	2 Apr 07
1.28 UK delivers ribbon pulling/welding machine parts to LASTI	Wilmot	Ottaway	15 April 07	1 may 07
1.29 UK (with US team support?) delivers assembled pulling/welding machine for use at LASTI	Wilmot/Glasgow	Ottaway	1 Jun 07	7 Jun 07
1.30 US delivers clear access route from laser welding room to assembly gazebo	Wilmot	Ottaway	1 Jul 07	05-Jul-07
1.31 US delivers test mass to LASTI ready for ear bonding	Glasgow/ Wilmot	Billingsley / Armandula	1 may 07	07-Jun-07
1.32 US delivers comp plate to LASTI (with bonded wire break off prisms) plus heating laser with ports to shine it through at LASTI	Wilmot/ Glasgow	Billingsley / Armandula	Oct/Nov 07	???
1.33 US delivers test mass ring heaters to LASTI (“needed” date allows for integration with clean metal assembly)	Wilmot/ Glasgow	Willems	1 May 07	7 May 07
1.34 US delivers baffles to LASTI	N/A	Smith	4 Jul 07	04-Jul-07
1.35 US delivers ring heater wiring to LASTI	Wilmot / Aston	Willems	15 Apr 07	15 April 07
1.36 US delivers tests plan for Noise prototype	Greenhalgh/Strain	Ottaway	01 Mar 07	01-mar 07
1.37 UK delivers clean OSEMs (plus spares) and wiring (plus spare?) to LASTI	Aston	Heefner	2 Apr 07	2 April 07

1.37a UK delivers dirt OSEMs for OMC	Aston	Romie	15 Mar 07	
1.38 UK delivers cleaned ESD wiring to LASTI	Aston	Romie/ Ottaway	02 Apr 07	04-Jul-07
1.39 UK delivers local drive electronics to LASTI	Aston	Heefner/ Ottaway	12 weeks after design agreed (ie about mid-June)	1-may-07
1.40 UK/US assembly team delivers clean metal suspension at LASTI	Wilmot	Romie/ Ottaway	30-Apr-07	30 Apr 07
1.41 US provides electronic drive/test system at LASTI	Aston	Heefner	???	To match 1.39
1.42 US provides alignment optical equipment + someone to drive it	Wilmot	Ottaway	30 April 07	30 April 07
1.43 US provides team to carry out tests on the ETM or ITM	Greenhalgh	Ottaway	10 May 07	10 May 07
1.44 UK/US team delivers ITM suspension to LASTI	Wilmot	Romie/ Ottaway	25 Aug-07	
1.45 UK/US team delivers ETM suspension to LASTI (US solders ESD wires to pattern)	Wilmot	Romie/ Ottaway	20-Sep-07	
1.46 US gives results of ETM thermal tests	Greenhalgh	Ottaway	1 Sep-07	1 Sep-07
1.47 US + UK gives go-ahead to START OJEU process	Wilmot/ Greenhalgh	Wilkinson	09-Jul-07	09-Jul-07
1.48 US + UK gives go-ahead to place main production orders (must come within a fixed time of the previous clearance)	Wilmot/ Greenhalgh	Wilkinson	08-Jan-08	08-Jan-08

Version 00, Sept 27 06 following first SUS-wide discussion.

Version 01 Oct 7, following SUS discussion.

Version 02 for SUS of 17 Oct 2006 with email inputs

Version 03 15 Nov 2006; has ETM before ITM (IW plan M030161-08 of 25 oct 06) and delay to optics at Glasgow (CAC plan M040019-07 of Nov 2006). Still need extra line items from Carol W. Changes from version 2 are in red text

Version 04 Updated urgently by Justin only without reference to others, in response to request from Dwight, Jan 10<sup>th</sup> 2007. Changes from version 3 are in red text

**Version 05, Jan 23 2007.** Updated by Justin in preparation for SUS meeting and following UK PMC in Jan M070007. Assumptions are: Delivery of clean metal parts skipped to 2 April 93 week slip); delays to RM and PU mean monolithic glass assembly slipped to 07 June (five week slip); BS/FM test assembly delays OJEU by three months. This draft made without access to detailed plans so dates are approximate. Added approx dates to “DONE” items for Carol. Most dates have changed from previous version. Yellow highlighting denotes changed text. This copy partially updated during meeting – version 6 will have confirmed updates.

Version 06 Feb 12 2007. Added new 1.27 for getting details of ribbon stretch (internal UK)

	<b>UK Rep.</b>	<b>US Rep.</b>	<b>Planned</b>	<b>Needed</b>
<b>2. FIRST ARTICLE: DIRTY UK ASSEMBLY SCENARIO</b>				
2.1 UK completes manufacture of dirty parts: metal masses, structure		Wilkinson/ Coyne		
2.2 US delivers noise prototype tooling to UK (or UK completes m/f of revised tooling)		Romie		
2.3 UK announces completion of dirty first article all-metal assembly		Wilkinson/ Coyne		
2.4 UK/US review of lessons learnt		Wilkinson/ Coyne		
<b>3. FIRST ARTICLE: CLEAN ASSEMBLY SCENARIO ALLOWS VIOLIN MODE DAMPERS TO BE FITTED</b>				
3.1 UK manufactures dirty masses, structure		Wilkinson/ Coyne		
3.2 UK pre-assembles dirty parts		Wilkinson/ Coyne		
3.3 UK/US review of lesson learnt so far		Wilkinson/ Coyne		
3.4 UK delivers dirty parts for cleaning		Romie/ Coyne		
3.5 US delivers cleaned masses, structure to assembly site		Romie/ Coyne		
3.6 UK delivers final assembly tooling (dirty)		Romie		
3.7 US delivers clean assembly area		Wilkinson/ Coyne/ Romie		
3.8 US delivers final assembly tooling (clean) to assembly site		Romie		
3.9 UK/US assembly team make clean metal assembly		Romie		
Next four steps optional:				
3.10 UK delivers non-metal masses, ears		Armandula		
3.11 US delivers pulling/welding jig		Armadula/ Ottaway		
3.12 US delivers plated reaction mass (If ETM first article)		Romie		
3.13 US/UK team pulls + welds fibres etc and assembles suspension		Armandula/ Romie		
Final step required in either case:				
3.14 Team delivers lesson learnt feedback		Romie/ Armandula/ Ottaway		

	<b>UK Rep.</b>	<b>US Rep.</b>	<b>Planned</b>	<b>Needed</b>
<b>4. FINAL DELIVERY AND ASSEMBLY</b>				
4.1 UK delivers dirty metal parts and tooling to location one		Romie		
4.2 US/UK team carry out dirty assembly		Romie		
4.3 UK delivers dirty metal parts for second assembly		Romie		
4.4 US delivers cleaned parts for second assembly and cleaned tooling		Romie		
4.5 US delivers clean assembly area		Romie/ Worden		
4.6 US/UK team carry out clean metal assembly (so when do we exercise ribbon pulling/welding?)		Romie		
4.7 UK completes delivery of dirty parts		Romie		
4.8 UK completes delivery of non-metal parts (masses, ears)		Romie		
4.9 UK completes delivery of final assembly tooling		Romie		
4.10 UK delivers completed documentation package		Romie/ Coyne		