

SUMMARY RECORDS

51st Meeting of

GARTEUR Group of Responsables for

Structures and Materials

The meeting was held at FOI, Stockholm – Sweden on 21/22 October 2004

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ATTENDANCE LIST
FRANCE

T. Khan	ONERA, Châtillon
D. Osmont	ONERA, Châtillon

GERMANY

H. Schröder	EADS AIRBUS, Bremen	IPoC
K. Rohwer	DLR, Braunschweig	

ITALY

A. Riccio	CIRA, Capua	
A. Minuto	Alenia, Pomigliano d'Arco	IPoC

THE NETHERLANDS

H. Ottens	NLR, Marknesse- Noordoostpolder	chairman
R. van Houten	NLR, Marknesse- Noordoostpolder	secretary

SPAIN

J. Maroto Sanchez	INTA, Madrid
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SWEDEN

S. Nilsson	FOI, Stockholm	
H. Ansell	Saab AB, Linköping	IPoC

UNITED KINGDOM

P. Curtis	DstL, Salisbury
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Excused

UNITED KINGDOM	J. Dee	Airbus UK	IPoC
FRANCE	R. Ohayon	CNAM, Paris	
THE NETHERLANDS	L. Hootsmans	Fokker, Papendrecht	IPoC
UNITED KINGDOM	S. Willocks	BAE Systems Airbus, Filton	IPoC
UNITED KINGDOM	P. Gates	BAE Systems Airbus, Filton	IPoC

Absent without notice

FRANCE	M. Mahé	AIRBUS France, Toulouse	IPoC
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**GoR - Structures and Materials,
51st Meeting held at FOI, Stockholm - Sweden, on 21/22 October 2004
22 October 09:00 a.m.**

AGENDA

1. Opening remarks and adoption of Agenda
2. Summary Records 50th GoR meeting
3. Action Items

Action Item	Responsibility	Action
50.1	Klaus Rohwer	Find out if a new IPoC can be found in place of Mr. Bühlmeier.
50.2	Harold Ottens	To discuss the matter of more persons from one company joining the GoR with the Council. Garteur is a collaboration between countries and not between companies.
50.3	Tasadduq Khan	To send the GoR an e-mail regarding the participation of M. Mahé
50.4	Harold Ottens	To get the information for the website from INTA to NLR. The website should then be available in 1-2 months.
50.5	Paul Curtis	To find out more about the members in the international birdstrike group (Europe + US?)
50.6	Paul Curtis	Will ask Mrs. M. Willows to inform the existing group and have the final report on AG24 ready first.
50.7	Klaus Rohwer	Rien van Houten will finalise the report on AG25 within 2 weeks.
50.8	Aniello Riccio	Will give a presentation on delamination growth based on energy criteria at the next GoR meeting.
50.9	Tasadduq Khan	Before closing down EG27 Friction Stir Welding, get in direct contact with the right person at Airbus via Hilmar Schnell and then report on this in the next GoR meeting.
50.10	All	Decide whether to form a new AG after a follow-up meeting of EG28.
50.11	All	AG29 proposal 'Interchangeability composite materials' will be accepted; all participants to send information before end of May to Paul Curtis and to Harold Ottens.
50.12	Hans Ansell	Will do his best at SAAB for participation in AG29.
50.13	Paul Curtis	Check materials manufacturers. He will circulate the final proposal which should be ready by the end of June.
50.14	Harold Ottens	Inform the Council about the forming of new Action Group 29.
50.15	All	All GoR members should inform each other on a regular basis about developments on Nanotubes.
50.16	Jonathan Dee	Give a presentation on Nanotubes in Spring 2005.
50.17	Harold Ottens	To check with Flight Mechanics Panel chairman on 'Morphing wing' program.
50.18	Sören Nilsson	Prepare a short presentation on shape control actuators for the next GoR meeting.
50.19	Tasadduq Khan	Ask D. Osmont (Onera) to give a presentation on Smart Structures and Materials at the next meeting.
50.20	Harold Ottens / Tasadduq Khan	Will give a presentation on what work was done at NLR and ONERA regarding 'Structural Health Monitoring' on composite structures

50.21	Hans Ansell	Prepare a presentation on the various topics for the next GoR meeting in Stockholm, Sweden.
50.22	All	To give an overview of the requirements which are used for UAV's.
50.23	Harold Ottens	Send the final Basic Document to the GoR members (this includes Letter of Adherence, Letter of Admittance which should be sent to Harold Ottens and to Paul Curtis).
50.24	Tasadduq Khan	Try to contact Dassault for a new IPoC.

4. Progress reports and status on current AG's

AG 24	<i>Bird Strikes</i>	P. Curtis
AG 25	<i>Pos-tbuckling and Collapse Analysis</i>	K. Rohwer
AG 27	<i>Fractographic Aspects of Fatigue Failure in Complex Composites</i>	P. Curtis
AG 28	<i>Impact Damage and Repair of Composite Structures</i>	K. Rohwer
AG 29	<i>Interchangeability composite material</i>	P. Curtis

5. Progress reports on current EG's

EG 27	<i>Friction Stir Welding</i>	T. Khan
EG 28	<i>Material Properties during curing</i>	H.H. Ottens
EG 29	<i>Birdstrike 2</i>	P. Curtis

6. New activities

EG XX *Structural and material requirements UAV*

7. Presentations

D. Osmont, Onera	: Actuators	(action 50.19)
Harold Ottens and Tasadduq Khan	: Structural Health Monitoring	(action 50.20)
Hans Ansell	: Integrated composite structures damage tolerance	(action 50.21)
	Damage tolerance of complex integrated metal structures	
	Damage tolerance of systems	
	Load monitoring of systems	

8. Possible new activities

- Smart structures and materials
- Any other topics

9. Website update

10. Any other business

11. Date and place of next meeting:

52nd meeting: 21 / 22 April 2005 in Italy (CIRA)

Closure of the meeting on 22 October at 14:30 hours.

Summary Records

1. Opening remarks – Adoption of agenda

The Chairman, Harold Ottens, opened the meeting and welcomed the participants, in particular Mr. Schröder from EADS Airbus Germany who will replace Mr H. Schnell (EADS Airbus Germany).

The agenda was adopted with following amendment and changes.

Added to the agenda (after point 5) was an overview of the GARTEUR Council meeting in October by Harold Ottens.

Added to the agenda (point 7) was a presentation on delamination growth by Aniello Riccio.

2. Summary Records 50th GoR meeting

The Summary Records of the 50th GoR meeting were approved.

3. Action Items 50.1 up to 50.24

AI 50.1:

The new IPoC for the German industry is Dr. Hans Schröder from EADS Airbus GE, responsible for structures, structural tests and fatigue. He is also Euclid Responsible.

AI is closed.

AI 50.2

The GoR members are nominated by the participating countries. The representation of members should preferably be country wise. The GARTEUR Council stated that in other groups similar problems arose.

AI is closed.

AI 50.3

T. Khan contacted Jean Francois Albert of Airbus France, head of Structural Analysis. It was not possible to point another person due to other priorities and workload. T. Khan will evaluate the situation again. He will ask Mr. Vaute (Dassault) within the next year.

(Action Item 51.1 ⇒ T. Khan).

AI 50.4:

Harold informed the GoR that the website's name has been "stolen" because it was expired and not extended on time. Someone in Slovakia claimed the website name, but he is willing to sell it back. At the next meeting this will probably be solved.

(Action Item 51.2 ⇒ H. Ottens).

AI 50.5:

Paul Curtis did not yet get the names of the members of the International Bird Strike Group.

(Action Item 51.3 ⇒ P. Curtis).

AI 50.6:

Rien van Houten mentioned that Mrs. Michelle Willows did send a proposal to the AG24 Group members for review. Paul Curtis will co-ordinate the actions of the Exploratory Group SM-EG29 until the Action Group actually starts. The current SM AG-24 will be open until the next meeting.

AI is closed.

AI 50.7

Klaus Rohwer showed the final report of SM-AG25 Post-buckling and Collapse Analysis. The report will be sent to the SM AG-25 members and the GoR.

AI is closed.

AI 50.8

Aniello Riccio will give a presentation on delamination growth under agenda item 7.

AI is closed.

AI 50.9

Tassaduq Khan mentioned that he had a recent meeting on friction stir welding with NLR (Ludmila Velterop) at ONERA. ONERA considers this as an important area. The person in charge at DLR has left, so there is no interest anymore for this topic at DLR, and hence no GARTEUR group will be formed. It will stay a bilateral action between ONERA and NLR.

AI is closed

AI 50.10

The topic of material properties during curing is discussed under agenda item 5.

AI is closed.

AI 50.11

The topic of interchangeability of composite materials is discussed under agenda item 4.

AI is closed.

AI 50.12

The topic of interchangeability of composite materials is discussed under agenda item 4.

AI is closed.

AI 50.13

Hans Ansell asked about the materials manufacturers. Paul Curtis will check with the materials manufacturers.

(Action Item 51.4 ⇒ P. Curtis).

AI is closed

AI 50.14

Harold Ottens informed the Council about setting up of a new Action Group 29, see also agenda item 5.

AI is closed.

AI 50.15

All GoR members should inform each other on a regular basis about developments on Nanotubes.

(Action Item 51.5 ⇒ All).

AI is closed

AI 50.16

Jonathan Dee will give a presentation on nanotubes in spring 2005.

(Action Item 51.6 ⇒ J. Dee).

AI 50.17

Tasadduq Khan wants information about the morphing wing program. ONERA starts a large internal project next year, called AVISAC. Morphing is a part of it. There could be possible interactions. Harold will provide more information.

(Action Item 51.7 ⇒ H. Ottens).

AI 50.18

The presentation on shape control actuators by Sören Nilsson has been postponed to the next meeting due to the large workload.

(Action Item 51.8 ⇒ S. Nilsson).

AI 50.19

The presentation on actuators by Daniel Osmont is given under agenda item 7.
AI is closed.

AI 50.20

The presentation on Structural Health Monitoring on composite structures by Daniel Osmont is given under agenda item 7.
AI is closed.

AI 50.21

The presentations on integrated machined parts and load monitoring systems by Hans Ansell are given under agenda item 7.
AI is closed.

AI 50.22

Tasadduq Khan mentioned that Dassault has a program on UAV's. He had a discussion with the structures side, but this is not the main issue in UAV's.
AI is closed

AI 50.23

Harold Ottens did send the Basic Documents to the GoR members and the concept letters of adherence and acceptance. Harold explained the purpose of these documents. For participating in an Action Group the authority of the management is needed, and for this a standard letter is used. Also from Universities such a letter is needed. These letters should be sent to the chairman (Harold) and to chairman of action group. The letter of adherence and acceptance are different ones, and both should be sent.

The letter of adherence covers the intellectual property rights etc., and that the person active will act according to Garteur rules. The letter of acceptance is a letter which expresses that one ones to take part of the Action Group. Check for Action Group SM-AG29 if papers of SAAB have been received.

(Action Item 51.9 ⇒ H. Ottens).

Harold will send the basic GARTEUR documents to Hans Schröder, and the letter of adherence to all other members.

(Action Item 51.10 ⇒ H. Ottens).

AI is closed.

AI 50.24

Item was discussed under Action Item 50.3. Tasadduq Khan will contact Mr. Vaute in March 2005.
AI is closed.

4. Progress reports and status on current AG's

SM-AG 24 *Bird Strikes*

Paul Curtis mentioned that the Action Group will be closed at the next meeting, after the final report has been finished. Mrs. Michelle Willows did send the Terms of Reference for the follow-on activity to the AG24 members for review. A meeting will be scheduled in December 2004 to discuss the Terms of Reference.

SM-AG 25 *Post-buckling and Collapse Analysis*

The final report is ready now and will be distributed in November. The Action Group is closed. Klaus Rohwer mentioned that the report should be referenced on the website. The distribution list of the final report should be checked, as the XC members should not be on it. **(Action Item 51.11 ⇒ R. van Houten).**

SM-AG 27 *Fractographic Aspects of Fatigue Failure in Complex Composites:*

Paul Curtis, the Monitoring Responsible, presented the activities of Action Group 27. The activities are 12 months behind schedule. Paul Curtis stated that the delay was caused by the poor deliverance of the material. The next meeting of the Group will be in December 2004. The relevant viewgraphs are presented in **Appendix A.**

SM-AG 28 *Impact Damage and Repair of Composite Structures*

The Monitoring Responsible, Klaus Rohwer, gave a short presentation on the progress of the Action Group. The group has two and a half years to go. The viewgraphs are presented in **Appendix B**.

SM-AG29 *Interchangeability of composite materials*

Paul Curtis mentioned that not all Letters of Adherence have been received yet. Missing are the Letters from: Imperial College, QinetiQ, CIRA, Hexel and Sener Borreas. (**Action Item 51.12 ⇒ P. Curtis**).

Harold received the letter from INTA and will send a copy to Paul Curtis. (**Action Item 51.13 ⇒ H. Ottens**).

The kick-off meeting will be held before Christmas. The Action Group can then start as soon as possible. Tasadduq Khan mentions a national program called AMERICO which runs at ONERA and has similar objectives. Interaction with this AG could be possible. Paul Curtis will contact Jean-Francois Maire at ONERA for more details.

(**Action Item 51.14 ⇒ P. Curtis**).

5. Progress reports on current EG's

SM-EG 27 *Friction Stir Welding (FSW)*

The EG was not started due to lack of interest. Tassaduq Khan suggested that this EG should be closed.

SM-EG 28 *Material Properties during curing*

Harold gave a short presentation about the topic. The viewgraphs are presented in **Appendix C**.

The proposal was made by NLR, but not much response was received on the proposal. The problem is not to be able to get funding for this project. Harold asked whether the proposal could be finished by another chairman, or to postpone it to 2006. Klaus answered that it takes a long time for the formalities to get done. Harold suggested that NLR could finalise the proposal and keep it as an EG team. It will be decided fall next year if there is sufficient interest and funding for an AG. NLR will finalise the proposal.

(**Action Item 51.15 ⇒ H. Ottens**).

SM-EG 29 *Bird Strike 2*

TassaduqKhan mentioned that ONERA Lille is interested (B. Lagrand). Also CEAT could be a possible partner. Roger Ohayon will become the Responsible for this Group. Paul Curtis will act as responsible until the proposal is approved. An EG-meeting will be arranged with a discussion of the proposal and work load.

6. Council meeting

Harold gave an overview of the council meeting. A discussion whether to set up an ERA-net parallel to GARTEUR or in co-operation, was held in the council. No decision was made yet. The viewgraphs are presented in **Appendix D**. Harold will inform the meeting about what is going on in the ERA-Net.

(**Action Item 51.16 ⇒ H. Ottens**).

7. Presentations

- **Delamination growth**

Aniello Riccio reported on "Energy criteria for delamination growth". Viewgraphs are shown in **Appendix E**.

- **Actuators for smart systems**

Daniel Osmont presented work on actuators. The viewgraphs are presented in **Appendix F**.

- **Several topics**

Hans Ansell presented work on several topics. The viewgraphs are presented in **Appendix G**.

Reduction of parts through high speed machining (ideas from 1999) and allowance for post-buckling (in SM AG-25).

Future work:

- Methods for shot peening
- Repair methods for thin integral structures
- Quantify overall damage tolerance capacity of integral structures

- **Health monitoring**

After lunch, Daniel Osmont presented work on health monitoring. The viewgraphs are presented in **Appendix H**.

8. Possible new activities

- **Delamination growth**

Interested: DLR, CIRA, DSTL, NLR(?).

CIRA will make a A4 description on delamination growth (**Action Item 51.17 ⇒ A. Riccio**).

- **Smart actuators**

Smart actuators are usually tied up to specific applications. Paul Curtis mentioned that for morphing structures there is a strong interest.

Interested: DSTL, ONERA, FOI.

ONERA will write a one page idea (**Action Item 51.18 ⇒ T. Khan**).

- **Nano technology**

Paul Curtis mentioned that after Christmas a project will start on this subject (Imperial College and QinetiQ, DSTL), looking at the replacement of carbon fibers with nanotubes.

ONERA has already done some work on this, but they were more focused on fibers. ONERA does not want to start all over again. At DLR also some work is going on, but they are looking more at particles. Keep topic as Cat. 4 (technology watch).

- **UAV's certification aspects**

No ideas came up. Structure is not a topic in UAV's. Garteur is too slow with regard to certification aspects. Low on the active list.

- **High speed machined parts, structural integrity**

Interested: NLR/Fokker, EADS, FOI

SAAB will write a one page idea (**Action Item 51.19 ⇒ H. Ansell**).

- **Load monitoring**

EADS has interest, but probably no funding. SAAB is doing a pre-study, but this is in an early stage.

Leave this item the list (no action).

9. Website

The status on the website was already discussed under agenda item 3.

10. Any Other Business

Following topics will be covered at the next meeting:

- Methods for mass estimation by Paul Curtis. For different materials or manufacturing methods there are no established methods yet. (**Action Item 51.20 ⇒ P. Curtis**).
- Through-thickness properties due to stitching by Paul Curtis. (**Action Item 51.21 ⇒ P. Curtis**). DLR and NLR showed their interest. Paul will write a one page description.
- High temperature composite applications (300-400 °C). (**Action Item 51.22 ⇒ P. Curtis**).

11. Date and place of the 52nd meeting

The 52nd GoR meeting will be held on 21/22 April 2005 at CIRA in Capua, Italy. The meeting will start at noon on Thursday 21st.

The 53rd meeting is planned on 20/21 October 2005 in France. The spring meeting of 2006 will be in Spain, but no date is set yet.

12. Closure of the meeting at approximately 14.30 hours

Action Item List

At this 51st meeting of the GoR S&M on 22 October 2004 at FOI, Stockholm, the following action items were recorded:

Action Item	Responsibility	Action
51.1	Tasadduq Khan	Try to contact Dassault for a new IPOC.
51.2	Harold Ottens	Transfer the GARTEUR website to NLR. The website should then be available in 1-2 months.
51.3	Paul Curtis	To find out more about the members in the international birdstrike group (Europe + US?)
51.4	Paul Curtis	Check materials manufacturers. He will circulate the final proposal.
51.5	All	All GoR members should inform each other on a regular basis about developments on nanotubes.
51.6	Jonathan Dee	Will give a presentation on nanotubes at the next GoR meeting.
51.7	Harold Ottens	To check with Flight Mechanics Panel chairman on 'Morphing wing' program and send information to Khan.
51.8	Sören Nilsson	Prepare a short presentation on shape control actuators for the next GoR meeting.
51.9	Harold Ottens	Check for SM-AG 29 if signed papers of SAAB have been received.
51.10	Harold Ottens	Send basic GARTEUR documents to Dr. Schröder.
51.11	Rien van Houten	Put SM-AG 25 report on the GARTEUR website.
51.12	Paul Curtis	Check whether letters of Adherence for SM-AG 29 have been received.
51.13	Harold Ottens	Sent copy of letter of Adherence for SM-AG 29 from INTA to Paul Curtis
51.14	Paul Curtis	Contact ONERA for possible interaction in SM-AG 29.
51.15	Harold Ottens	Finalise proposal for SM-EG28, Material properties During Curing.
51.16	Harold Ottens	Inform GoR about what is going on in the ERA-Net.
51.17	Aniello Riccio	Make one page description of new activity on delamination growth.
51.18	Tasadduq Khan	Make one page description of new activity on smart actuators.
51.19	Hans Ansell	Make one page description of new activity on high speed machined parts.
51.20	Paul Curtis	Prepare a short presentation on methods for mass estimation.
51.21	Paul Curtis	Prepare a short presentation on thru-thickness properties due to stitching.
51.22	Paul Curtis	Prepare a short presentation on high temperature composite applications.