

# EUROMECH

# Final Report

EUROPEAN MECHANICS SOCIETY

Please send this report to the Secretary-General of EUROMECH, within one month after the Colloquium.

EUROMECH Colloquium No: 346

Title: *Fretting Fatigue (including Wear and Corrosion)*

Dates and location: *March 20-22 1996 Mansfield College Oxford*

Chairman: *D. A. HILLS*

Co-Chairman: *D. NOWELL*

Is there need of another Colloquium on the same or a related subject? Which year? *Not yet!*

Full registration fee: *£170*

What other funding was obtained? *None*

What were the participants offered? *Accommodation & meals for 3 days  
+ bound list of abstracts.*

Number of members of EUROMECH (reduced registration fee): 0

Number of non-members of EUROMECH (full registration fee): 28

Number of participants from each country:

Austria	_____	Germany	<u>3</u>	Romania	_____
Belgium	_____	Great Britain	<u>9</u>	Russia	_____
Byelorussia	_____	Greece	_____	Slovakia	_____
Bosnia	_____	Hungary	_____	Slovenia	_____
Bulgaria	_____	Ireland	_____	Spain	<u>3</u>
Croatia	_____	Italy	_____	Sweden	<u>2</u>
Czech Republic	_____	Latvia	_____	Switzerland	_____
Denmark	_____	Lithuania	_____	Ukraine	_____
Estonia	_____	Netherlands	_____	Yugoslavia	_____
Finland	_____	Norway	_____	Others ( <i>us</i> )	<u>1</u>
France	<u>10</u>	Poland	_____	Total	<u>28</u>
Georgia	_____	Portugal	_____		

Please turn

**Scientific Report**

*As attached*

**Please use additional pages if needed. Put date and signature at the end.**

**Euromech Colloquium 346**  
**Fretting Fatigue**  
**(to include corrosion and wear)**

**Mansfield College,**  
**Oxford**  
**20-22 March 1996**

This colloquium attracted a total of 28 participants, including four members of the host department, the Department of Engineering Science, Oxford University. Details of the colloquium were circulated to a wide range of interested individuals, including a list supplied by Euromech, and lists of participants at recent fretting conferences in Sheffield, England, and San Antonio in the USA. Only one non-European attended the conference. Some interest was shown by possible participants from Eastern Europe, but in the end a lack of travel funds prevented their coming. Also, in a few cases the chairman had some difficulty in dissuading applicants from areas outside fretting phenomena from pursuing their applications to attend.

Technical Content

It was very noticeable that several groups had independently arrived at the same conclusion about the most fruitful areas for future work. It was quite widely accepted that problems of modelling crack growth had now been solved, and there was little left to do in determining stress intensity factors for cracks propelled by contact loading. There was, instead, very considerable interest in trying to quantify the conditions under which fretting fatigue cracks initiate. It was recognised that there are both similarities with and differences from plain fatigue, and various models at the sub-grain level were put forward. These were based either on microplasticity or the motion of dislocations on persistent slip bands, which may be simply an alternative view of plasticity at the very earliest stages of crack initiation. Lively debate on these theories ensued, with an agreement that we should exchange views, and preferable also post-doctoral visitors, regularly. The first few examples of the latter are already being arranged.

There was also some debate about another feature which separates fretting fatigue from plain fatigue; that is, the presence of self-arrested cracks which arise as a result of contact loading, but are never propelled to failure by bulk loading. It was agreed that this was a feature meriting further analysis.

No papers were presented on the suggested and advertised allied topics of fretting wear and fretting corrosion.

Administration

Participants were attracted from France (10 people), Germany (3 people), Spain (3 people), Sweden (2 people) and the US (1 person), in addition to 5 British from outside Oxford, and 4 local people. The conference was held at Mansfield College, Oxford, and we were pleasantly surprised at the kind remarks about the accommodation and organisation made by several of the participants. Pre-payment of the colloquium fees was requested, and this helped to reduce our work during the meeting. The fees charged were sufficient to cover two nights stay, the equivalent of 60DM, as requested in the Euromech notes for chairmen, and a small amount to cover the costs of encashing foreign instruments at the bank. The Engineering Science Department here lent us the money to provide a 'float' to run the

finances. We have re-paid this and made a small 'profit', which we hope the department will retain on our behalf for the time being, and would help us to launch another colloquium in due course.

There was some discussion at the colloquium about future activities. We are not sure at the moment that we foresee a need in the immediate future for another meeting on fretting phenomena, but considerable interest was expressed in the notion that we hold a meeting on the numerical modelling of cracks, particularly concentrating on strain nuclei and eigenstrain type procedures. Clearly, this would attract a very much wider potential audience.

D.A. Hills  
D. Nowell.  
16.5.96