

## **RAE2001, UoA30**

### **MECHANICAL, AERONAUTICAL AND MANUFACTURING ENGINEERING PANEL**

#### **OVERVIEW REPORT**

##### **General**

Forty-seven universities made submissions to UoA30 with 1,172 staff reporting 4,361 research outputs. The Panel was made up of 11 academics and 3 industrialists. Half of the Panel members had no major interest in any of the universities in the submission and were able to express an independent view on all submissions. It was agreed not to cross-refer submissions to other panels or to appoint specialist advisers. The Panel spent five one-day meetings in the assessment phase of the process; towards the end advice was taken from overseas advisers.

##### **Assessment Process**

**Step 1 - Basic approach and division of tasks:** The full Panel conducted a pilot assessment of three of the submissions, compared their results and agreed on guidelines for the assessment process. The submission was split into two equal parts with six panel members allocated to each part where they scored all of the outputs in RA2 and the RA5/6 (out of 10). The Chairman and Vice-Chairman examined and scored all submissions. In addition individual responsibilities for particular universities were allocated to twelve panel members to ensure that more than 10% of each submission's output was examined in detail and also to take the lead in discussion as appropriate. The Chairman and Vice-Chairman took an overview and examined additional outputs in detail. Overall approximately 34% of the outputs were examined in detail.

**Step 2 - Derivation of raw data:** Individual scores for each Panel member for all outputs were entered on the spreadsheet provided by the RAE Team. All individual RA2 output scores were examined and the marks of the individual panel members (6 + 2) were discussed and adjusted if appropriate. Thereafter RA2 averages per Institution for each panel member and RA5/6 scores were extracted, ranked and outliers reconsidered. The RA3 data was numerated on graduate output, with Doctoral students counting more than Masters, and the outcome normalised by FTE staff. The RA4 data was assessed in terms of the research funding per FTE staff. From these considerations consolidated raw data were obtained at institution level.

**Step 3 - Processing of raw data:** One of the industrial members of the Panel took in hand to produce a spreadsheet and handle the processing of the data. The RA2, RA3, RA4, RA5/6 data were brought to a common mean and standard deviation before weighting factors were applied. Care was taken in bringing the two halves of the submission together and the scores of the Chairman and Vice-Chairman for the whole submission were used to make minor adjustments in order that all forty-seven institutions could be placed on a single ranking. A variety of weighting factors were applied within the boundaries indicated in the criteria and rankings established for each case. After discussion, one indicative set of weightings with its corresponding ranking was chosen as a guideline for grading.

**Step 4 - Final grading:** Each individual submission was discussed by the Panel in order to map the results on to the grading criteria. This included taking account of the indicative rank from the weighting process, the RA2 output, the RA5/6 scores, input from the lead panel member for that submission and a collective judgement on the percentage of activity and output at different levels of excellence. Individual panel members with a major interest in any submission were excluded from any detailed discussion on that submission. Provisional grades were awarded at the penultimate meeting with several noted for reconsideration at the boundaries between grades. At that stage the external overseas advisers were consulted. At the final meeting the overseas advisors comments were discussed in detail and all submissions where they had made detailed

comments were revisited. In addition, all boundaries were revisited and submissions which individual panel members suggested should be reconsidered were discussed. Final grades were then agreed. In virtually all cases the grading allocated was unanimous.

## **Observations**

The considered opinion of the Panel was that the level of research excellence exhibited in the submissions had improved considerably since the previous exercise in 1996. There was good evidence that more institutions were performing at a high level. This was primarily due to the overall improvement in the quality of research outputs, often coupled with significant achievements or evidence of peer esteem, which extended through many of the submissions, albeit to varying extents as reflected in the grades. Another factor in the overall improvement arose because a number of institutions with low scores in 1996 had not submitted, together with the fact that some submissions had been focused on fewer staff. Approximately 40% of the submissions returned  $\leq 75\%$  of staff as research active. These factors made discrimination quite difficult, particularly in the higher grades, which is probably the reverse of the situation experienced with previous exercises where lower grades had less apparent discrimination.

This UoA, being one of the larger ones, embraced a wide range of activity. The Panel was pleased to recognise the quality of a number of interdisciplinary contributions including an increase in work across the Life Sciences/Engineering interface. However, in a few cases submitted work appeared to have no direct relevance to engineering issues and the Panel felt that in any future exercise the UoA scope should be defined to focus on engineering and its direct applications. It was also evident that some of the smaller submissions were focused in fairly specialist areas. However, there is a substantial number of enormously strong, vibrant departments with a good coverage of the major areas of the submission. Some submissions demonstrated excellent investment in infrastructure either through JREI, Regional Development support or direct Institutional financing. This is encouraging but unfortunately these institutions are in the minority and there still seems to be a general lack of infrastructural investment across the UoA which may frustrate additional aspirations of international excellence.

The reports from the overseas advisers were encouraging, not only in that they broadly supported the provisional gradings suggested by the Panel, but also because of their clear endorsement of judgements related to international excellence. This helps to confirm that the best of UK researchers in this UoA are equivalent to the best researchers worldwide.