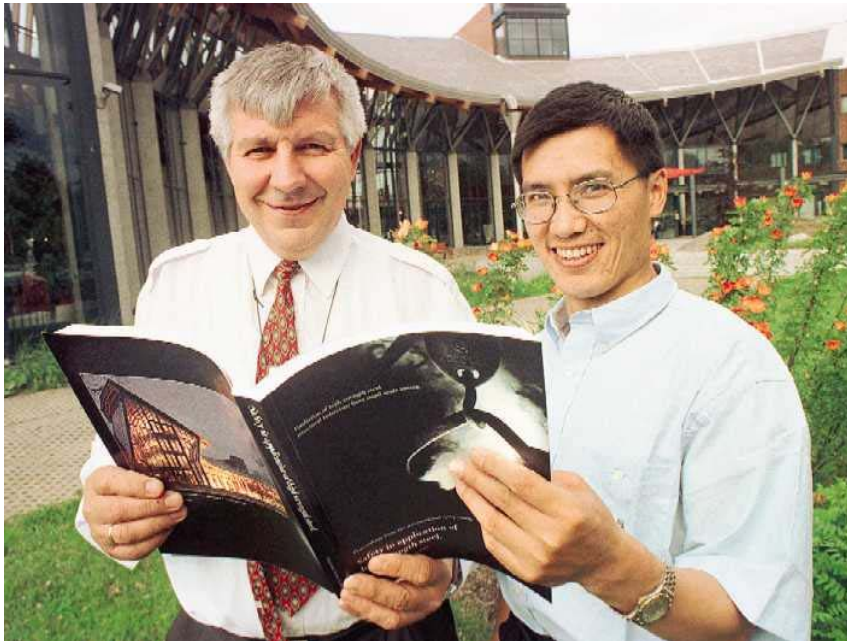


## Testing and characterization

### Safety in application of high strength steel



*Olaf Andersen (STATOIL)(left) and Zhiliang Zhang with the symposium proceedings "Safety in application of high strength steel".*

The new class of high-strength steel, which is now commercially available, requires new methods for assessing the material's behaviour. In particular, fracture toughness must be documented. Acceptance criteria and level of safety for high-strength steel weldments has been developed as a result of the ECSC (European Coal and Steel Community) and the Norwegian research project ACCRIS.

The project has involved the whole chain of steel suppliers and users. Manufacturers of advanced high-strength steels and welding consumables, engineering and fabrication companies and experienced end users have jointly been cooperating with SINTEF and other research institutes. Together, they decided on specifications of necessary fracture mechanics and design-based acceptance criteria for the high-strength steels and their welds. A new procedure, called J-Q-M, has been developed, in which the effect of geometry and material mismatch is taken into full account.

The new materials offer a large potential for weight and cost savings in the offshore industry. In one case, the weight of a deck structure was reduced by more than 20% when 350 MPa steel was substituted with 500 MPa steel. The cost reduction was calculated to 13%. The demand for high-strength steels is expected to increase in the future, in offshore industry as well as in transportation. As light constructions and ships made of high-strength steel reduce energy consumption, the materials may have a very positive environmental impact.

During the four year project period starting in 1993, ACCRIS has gained international recognition. In July 1997, the ACCRIS organised the international symposium "Safety In Application of High-Strength Steel" in Trondheim, Norway with participants from more than 15 countries. The contributions highlighted requirements to weld toughness, material mismatch and treatment of residual stresses.

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