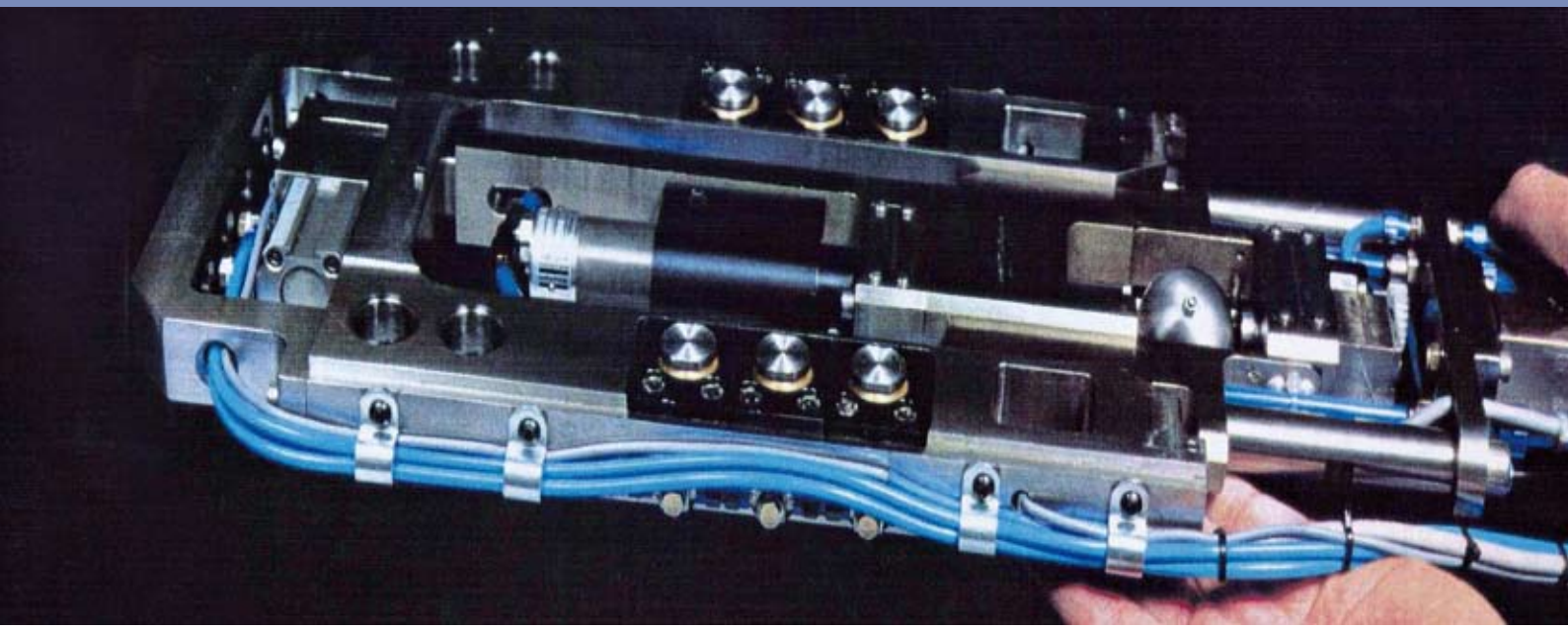
Rolls-Royce

Scoop Sampling

Extraction of material samples for examination and analysis

COMMISSIONING AND IN-SERVICE SUPPORT



An in-situ, low intrusive, material sampling technique customisable to meet specific customer requirements.

The complete sampling service

Whether you require material samples to support PLEX justifications, or need samples to be taken from remote locations to allow detailed examination and subsequent diagnosis of a defect or flaw, Rolls-Royce can supply the complete sampling, analysis and reporting service.

Sampling packages are tailored to meet individual customer needs. They can vary from provision of SSam™-2 machines and operators for in-situ scoop sample removal, to full analysis and reporting of results. If necessary, bespoke machines and equipment can be designed to meet the particular requirements of a project.

The need for scoop sampling

In order to support the design and operation of plant and equipment within the power generation, processing, chemical and associated industries, it is sometimes necessary to remove small test samples from specific components for analysis.

The information obtained from scoop samples can be used to support plant safety justifications, design criteria, life extensions, remnant life assessment, maintenance and inspection requirements, failure mode investigations, etc. The relatively small amount of material provided by the scoop sampling process can provide the metallurgist with a wealth of information.

Samples can be prepared for material characterisation under optical, high resolution scanning transmission or electron microscopy. Features such as small surface cracks, or the conditions existing at grain boundaries, can thereby be directly investigated.

Test pieces can be manufactured from the samples for assessing material properties such as fracture toughness, hardness and radiation embrittlement. In addition, test coupons can be made for tensile, fatigue and creep testing, or evaluation in corrosive environments.

In conjunction with Exponent Inc, Rolls-Royce can offer a Punch Testing service. This technique uses established correlations to provide reliable FATT data from miniature disc specimens that can be cut from the scoop samples.

- **Material property validation**
- **Defect analysis**
- **Remote operation**
- **Low stress raising feature of sample site**

SSam™ -2 scoop sampling

Using a thin, 50mm diameter hemispherical shell cutter, the SSam™-2 machine removes a small 'button' shaped sample of material that is, typically, 25mm in diameter and 4mm thick. The actual shape and thickness of the sample will depend on the component geometry and the depth of cut setting.

A low stress raising dimple, with a high surface finish, is left behind on the sample site. As no remedial action is generally required, the process can be viewed as the ideal 'non destructive' material sampling technique.

Rolls-Royce has used this technique for a wide range of industrial applications. With 15 years operating experience, an in-depth knowledge has been built up of the machine's performance on a variety of materials.

- 70mm in diameter, 420mm length.
- Can be configured to operate within rotor bores or on the outside of pressure vessels

SSam™ -2 scoop sampling machine

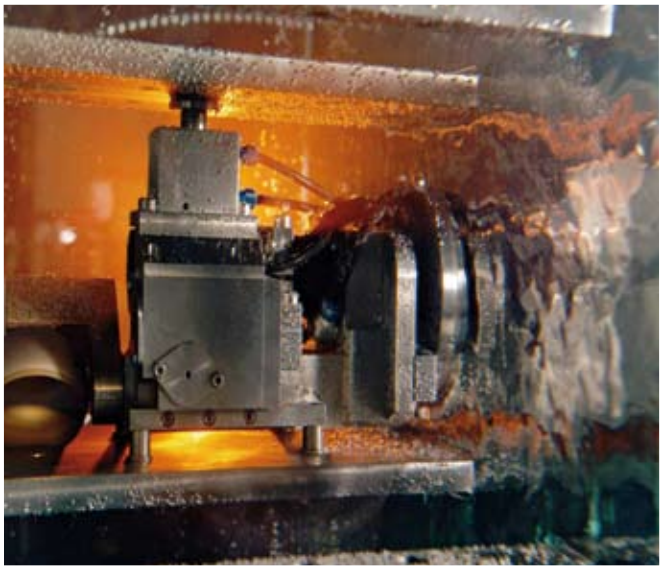
Special purpose scoop sampling machines

Where environmental or space envelope restrictions dictate, it may be necessary to design and develop special purpose scoop sampling equipment.

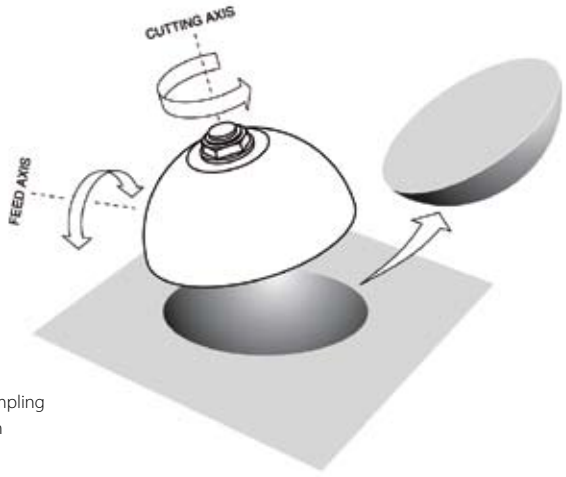
Whereas the SSam™-2 machine is 70mm in diameter, Rolls-Royce has undertaken the design and development of smaller application specific sampling equipment. In one instance the machine was designed to fit within a 38mm diameter tube bore. In another case, the machine fitted within a 30mm annulus. For both applications, samples up to 4mm in thickness could be produced.

Where operator access to the sampling site is not possible, special sample site location devices can be produced. Besides ensuring the sampling machine is firmly clamped in the correct position, they also allow the cutter subassembly to be removed for cutter change. The cutter subassembly can be returned to the location jig and the partial cut completed without loss of position.

To monitor sample cutting in remote conditions, cameras and lighting can be fitted within the body of the location jig. The addition of accelerometers and microphones provide additional operator feedback of cutting performance.



Underwater scoop sampling



Scoop sampling illustration

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