Rapid changes in South Africa’s political, social and economic environment over the past decade have created a platform for a more rational and up-to-date industry approach to the economics of road construction and maintenance.

Piet Myburgh, executive director of Sabita, said this week that the increasing preparedness of politicians to be guided by economic and scientific principles in the allocation of public funds for road construction and maintenance made it vital that all available information be current, appropriate and relevant.

“Sabita’s Manual 7: SURF+: Economic Warrants for re-surfacing gravel roads, is a case in point. Developed in the period 1989-1993 to facilitate the process of economic analysis of road projects, particularly the upgrading of gravel surfaces to a permanent surface standard, the text covered the quantification of economic benefits and costs, including the cost of maintenance throughout its economic life, and included road user costs.

“These total costs should ideally be minimised, and to do so a technical evaluation, covering the interrelationship between traffic loading, the environment, construction standards, material characteristics and vehicle operating costs in relation to surface characteristics should be incorporated into the evaluation.”

Quantifying social costs

He said it would therefore be advisable to upgrade SURF+ — not only to update the data used to perform the analyses, but also to reflect recent progress in recognising and quantifying social costs, institutional capacity and government policy on employment creation.

“It is important to note that the determination of social benefits or disbenefits arising from the provision or absence of adequate road infrastructure is increasingly within the reach of tangible assessment – a factor which should be included in any economic evaluation of road projects, and which could have wide implications for the government’s Expanded Public Works Programme (EPWP).

Work opportunities

This wide-ranging plan to spend R15-billion over the next five years on labour intensive upgrading of rural and municipal infrastructure aims to create work opportunities for at least one million people during the upgrading and maintenance of 37 000km of rural and municipal roads. The objective is that the EPWP will form the foundation of a sustainable employment creation programme – which Sabita believes will yield non-road sector employment as an improved road network opens up new commercial development nodes and opportunities.

In conjunction with Sabita’s Infrastructure Development Programme (SIDAP), which focuses on developing a regimen for Opportunity Value Assessment (OVA) to quantify the benefits of roads to off-road social infrastructure, the EPWP is expected to accelerate South Africa’s social and economic development.

Myburgh stressed however that it was vital such development be as cost effective as possible, and that it reflect both recent advances in construction thinking and resource analysis.

One example is the increasing scarcity of good quality wearing course gravel. Recent studies have shown also that aside from the continued depletion of a diminishing resource, the cost of construction and maintenance of conventional gravel roads that will provide a generally poor quality wearing course is unacceptably high.

According to Philip Paige-Green (CSIR Transportek) and...
John Hongve (International Labour Organisation), the “better use and/or improvement of in situ material by emulsion or chemical stabilisation in combination with the provision of low cost bituminous seals results in lower predicted life-cycle costs than the gravelling option”

**Regravelling unsustainable**

In a paper delivered at the Tenth Regional Seminar for Labour-based Practitioners in Arusha, Tanzania in October last year, Paige-Green and Hongve concluded that “it would be more cost effective to pave the existing (in situ) materials with a low cost seal than to acquire materials for unsealed roads, which would need to be repeatedly re-gravelled in an unsustainable programme.”

These conclusions were based on studies of the Gundu Lashu labour intensive rural roads maintenance programme currently underway in Limpopo Province.

As part of the programme, the Roads Agency Limpopo engaged the CSIR to assess different options to the provision and maintenance of good gravel wearing courses, in financial and economic terms, as well as their suitability for labour-based operations.

Paige-Green and Hongve conclude that “appropriate seals include double sand and grit seals and the Otta seal, all of which are highly tolerant to low experience contractors and have significant benefits in that they make use of local materials requiring minimal processing.”

“The rehabilitation of gravel roads is not regarded by many engineers as proper engineering, but merely as a maintenance function. Moving a step up to low cost sealing could therefore finally ensure acceptance of the technology and sustainability of labour-based road programmes beyond the ever-recurring pilot phase.”

Myburgh said there were strong indications in the Paige-Green/Hongve studies that the EPWP would alter and probably lower the economic thresholds for surfacing of gravel roads using labour intensive methods.

“The lowering of this threshold arises from the social benefits inherent in the sustainable employment opportunities offered by the construction and maintenance of low volume roads. In addition, SIDAP’s focus on Opportunity Value Assessment (OVA) quantifies the benefits to non-road (social) infrastructure that are served by adequate road infrastructure (or the penalty to that infrastructure through the absence of good roads).

“The quantifiable output benefits of serviceable roads can now extend beyond the savings to road users through reduced vehicle operating costs and time costs. The equation can now include not only the social benefits of having all-weather and safe access to schools, clinics and other elements of social infrastructure, but also the deepening and widening of capital in regions to create off-road employment opportunities and development.”

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**Bitumen delisting: final negotiations underway**

The project initiated by Sabita in 2002 to research the options for classification and disposal of penetration grade bitumen is approaching conclusion, with negotiations between the project team and the Department of Water Affairs and Forestry (DWAF) now in their final stages.

A technical report prepared by Sabita’s Bitumen Classification Project Team was submitted to DWAF in November 2003. After familiarising themselves with the basis for the industry’s stance, DWAF has now requested a formal application for the delisting of bitumen from Sabita. The application will be supported by documentation reflecting global best practice.

This application will open the door for DWAF’s acceptance of the delisting process, after which the Sabita Project Team will list countrywide waste disposal sites that comply with the new specification for the disposal of bitumen waste.

**Binding assurances**

It was pointed out at a meeting of the two parties in February 2004 that structural re-alignment was currently underway to transfer control of waste management from DWAF to the Department of Environmental Affairs and Tourism (DEAT). However, this will only be finalised in April 2005, and assurances were given that decisions taken by DWAF will be binding on DEAT.

Sabita’s bitumen de-listing initiative was already underway at the time the Centre for Occupational Safety and Health and Environmental Conservation (COSHEC) was formed, but COSHEC has now taken custody of the negotiation process with DWAF, and will guide it to finalisation as one of its five key activity areas identified during 2003.

Each activity has been assigned a lead person and a working group to research and identify conventional global wisdom and best practice, and to devise implementation strategies and guidelines for the industry.

The five key activity areas and lead persons are:

- **Safe work practices** Corrie van der Westhuizen
- **Bitumen safety training** Mitch Schafer
- **Transport/disposal of pen. grade bitumen** Jacques Myburgh
- **Incident reporting** Mitch Schafer
- **Defining alternatives to coal tar** Trevor Distin
Already powerful, but still rapidly developing with the addition of emerging ideas and experience, the new Rubicon suite of flexible pavement design and analysis software is finding increasing use among South African consultants and engineers.

Developed by Dr Fritz Jooste, founder of Modelling and Analysis Systems (MAS) cc, the Rubicon software is unique in its ability to interact with users to ensure that they can correctly implement the product features in real design situations.

Long term relationship with practice

“Traditionally, pavement design software has been developed as part of specific sponsored research projects, and this software rapidly became outdated on the completion of that project. Our goal with Rubicon, therefore, was not just to develop a software product, but also to start a long-term relationship with pavement designers. In this relationship the software becomes the delivery vehicle for new technology as well as for training. Under this regime practitioners can feed their ideas and experiences into a growing set of software tools,” Dr Jooste said.

A recent example of the implementation of new technologies through Rubicon is the incorporation of the transfer functions for foamed bitumen layers in flexible pavements. This technology was incorporated into Rubicon soon after publication of TG2: Interim technical guidelines for the design and use of foamed bitumen treated materials, and makes it now one of the few design tools that accommodate asphalt, emulsion treated and foamed bitumen materials in the same software platform.

The Rubicon model for long-term support and improvement of pavement design software is illustrated below:

Multi-faceted platform

Aside from its focus on continued product improvement through industry feedback, the package also implements a novel approach to pavement design in which not one, but several approaches are accommodated. In addition to the transfer functions from a range of countries, the software includes linear layered elastic and finite element response models, as well as the more traditional AASHTO (1986 version) and catalogue design methods.

“Almost all designers who have used the mechanistic-empirical design method are aware of its shortcomings, which mostly relate to the method’s sensitivity to layer stiffness assumptions. What we have tried to provide through Rubicon is a more comprehensive approach to pavement design, in which designers can evaluate design inputs not only through the manual and automated backcalculation modules, but also through the stress-sensitive finite element model which evaluates the material stiffness in different locations within the pavement.”

“We also encourage an experience-based approach in which engineers are urged to cross-check designs using established practice. They can do this by comparing their proposed designs to catalogue structures recommended for the same traffic demand. This approach, which we explain in detail in our training workshops, provides a rational basis for the selection of design assumptions and also removes much of the uncertainty associated with the mechanistic-empirical design process.”

Proposed new features

Proposed new features for the programme will focus on the integration of design, reporting and pavement condition analysis tools.

Technical information on the Rubicon suite is available from Dr Jooste at fritzj@modsys1.com or on the website www.modsys1.com.
Sabita Council member Trevor Distin attended the 12th International Conference on Flexible Pavements in Melbourne in October 2003, said some of the issues that were raised could have interesting implications for the local market.

“Like South Africa, seals hold a dominant position as the primary form of surfacing in both Australia and New Zealand. In New Zealand the procurement method for the provision of seals had changed to one where portion of the liability for the performance of the seal had moved towards the contractor. The contractor is now obliged to deliver a specified minimum texture depth after 12 months. The significance of this is that the responsibility for the seal design has shifted to the contractor. This concept has been further extended to 10-year network management contracts with 5 contracts in operation.

Revision of seal design

The biggest problem faced in New Zealand is bleeding in the wheel paths which has resulted in corrective methods such as water cutting and variable application of binder.

“On the Australian front spray sealing technical issues are addressed by the Austroads National Bitumen Surfacing Research Group, which covers major projects in seal design and binders. This has resulted in a revision of their seal design method which was based on the South African practice. This was done through a number of national validation trials with the following outcomes:

- Changes in binder spray rates for low and for heavy traffic volumes
- Reduction in aggregate spread rates by as much as 20-30%. The later development presents significant savings in aggregate and handling costs.

Cooperation

“With the rapid loss of experienced practitioners in seals over recent years, the thought comes to mind that there is potential for greater cooperation between the Australasians and ourselves in areas such as:

1. Seal design - peer revisions and perhaps even a single seal design manual.
2. Specifications - with the desire to move towards performance-based specifications, there is merit in developing and adopting similar test methods in order to make meaningful comparisons.
   In the same sense there is an opportunity for the Australasians to make use of our Agrément system of product certification.
3. Work practices: AAPA has developed extensive training materials which cover all aspects of spray sealing, with a strong emphasis on safety. These materials could be adapted for local use.

Because the Conference on Asphalt Pavements for Southern Africa (CAPSA’04) is scheduled to be held at Sun City in September, the blacktop industry has resolved that only one Road Pavements Forum meeting will be held in 2004.

The date for the meeting has been set for 16-17 November, and the venue will be announced closer to the date of the event.

A CD-ROM containing the full proceedings of the 12th AAPA International Conference on Flexible Pavements is available for purchase from www.aapa.asn.au
A new guideline, incorporating global conventional wisdom on the identification of the hazards associated with various operations in the handling of bituminous products, and offering precautionary procedures to minimise the risk of exposure to such hazards, will shortly be available to the local manufacturers, applicators and practitioners.

South Africa’s health, safety and environmental practices in the bitumen industry were previously guided by Sabita’s Manual 8: *Bitumen Safety Handbook*. These practices have now been re-examined in the light of both current legislation, and international best practice in worker safety, health and environmental conservation.

Entitled *Guidelines for the safe and responsible handling of bituminous products*, this new manual reflects latest local and international experience, including that of the Road Pavements Forum Binder Distributor Task Group, CONCAWE, the Refined Bitumen Association (RBA), Eurobitume, Austroads, the New Zealand Pavement and Bitumen Contractors Association (NZBCA) and the Australian Asphalt Pavement Association (AAPA).

**COSHEC**

The publication will be issued under the auspices of Sabita’s Centre for Occupational Health and Safety and Environmental Conservation (COSHEC).

A feature of the content of the guideline is the definitive policy statement contained in the Preface: “As it is now globally accepted that the use of coal tar products as binders for road construction may introduce undue health and environmental hazards, their use is no longer considered best practice. Sabita therefore does not endorse their application, and reference to this material is excluded from this document.”

The content of the guideline includes the identification and management of potential hazards, personal protection, first aid, the health aspects associated with bitumen in various forms, fire classification and prevention, fire fighting equipment, procedures for responsible loading and transportation, application and waste management, legal responsibilities and equipment maintenance.

Comprehensive appendices detail the contents of a first aid kit, guidance for the treatment of bitumen burns (including a “Burns Tag” to accompany a patient to hospital), risk assessment tools, vehicle check lists and guidelines on the flammability of cutbacks.

Details of availability will be announced shortly on the website [www.sabita.co.za](http://www.sabita.co.za).
With the 8th international Conference on Asphalt Pavements for Southern Africa (CAPSA’04) now just six months away, it is already apparent that this conference will once again be the premier venue in Africa for showcasing local and international blacktop know-how.

The conference opens at Sun City in the North West Province with a cocktail function on the evening of Sunday September 12, and will be followed by four days of highly interactive plenary, parallel and workshop sessions. The conference theme “Roads - the arteries of Africa” will be supported by session themes covering Economic growth and development, Efficient road provision and maintenance, Human capital development and Best practice in flexible pavement design, construction and maintenance. Already more than 130 refereed (conventional papers which will be peer reviewed and allocated to a specific session) and bulletin (synoptic accounts of recent experience or findings, innovative solutions and lessons learned) papers have been received, and delegates from more than 18 countries have declared an interest in attending.

Following on the success of CAPSA’99 in Zimbabwe, CAPSA’04 has been structured to provide maximum opportunity for debate and interaction.

Practitioners wishing to highlight up to the minute developments or controversial issues, may be invited to present their case for discussion at a poster session scheduled for Tuesday 14 September from 15h00 onwards. Posters will be restricted by invitation to about 30 topical papers, details of which will be posted on the CAPSA’04 website closer to the conference date.

Invitations to exhibit at CAPSA’04 have already been sent out. The exhibition will be held in the Hall of Treasures at Sun City, which will also be used for all tea and lunch breaks.

The conference will concluded with a spectacular gala event on the evening of Thursday 16 September. Further detail of CAPSA’04 is available on the website http://asac.csir.co.za/capsa.

Revised Councillor Empowerment Programme set for launch

A revised and updated Councillor Empowerment Programme, developed to be more aligned with structural changes within the various local and provincial government sectors, will be presented in centres throughout South Africa during 2004.

Devised by Sabita's Urban Renewal and Rural Development Focal Point (URRUD), and based on the highly successful Local Councillor Empowerment Programme first developed in 1997, the new programme will be delivered as a series of half-day workshops, and will, within the framework of revised municipal structures, endeavour to raise local councillors’ awareness of:

- revised municipal structures;
- the socio-economic benefits of adequate roads;
- roads engineering processes and technology;
- the importance of asset management;
- employment opportunities in road construction and maintenance.

Councillors will also be given basic information on:

- rational decision making;
- business planning;
- implementation planning; and
- staff management.

An important feature of the workshops will be to impress on councillors their role and responsibilities in delivering quality outputs to their constituents, and a full range of clear illustrative material, in the form of graphics and photographs, has been prepared to encourage interaction and understanding. The workshops will be launched in May 2004.

URRUD convenor
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