



CONSTRUCTION PROFILES

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SMOOTHING THE SILK ROUTE AS EAST MEETS WEST

The nation of Georgia is located on what is known as the ‘crossroads’ between Western Asia and Eastern Europe. It lies to the east of the Black Sea and is one of the shortest routes between western China and Europe. Since the Middle Ages, this strategically important country has played host to one part of the road known as the Silk Route.

The government of Georgia has made development of the country’s transport infrastructure a priority and in 2006 requested assistance from the World Bank and the International Bank of Reconstruction and Development to help modernize its East-West transport corridor. This part of the old Silk Route remains internationally important because it remains part of a corridor connecting Europe with Asia without needing to enter either Russia to the north or Iran in the

south. Today Georgia’s East-West transport corridor forms part of the pan-European E60 route which runs from the Atlantic Coast in France to Irkeshtam in Kyrgyzstan on the border with People’s Republic of China.

The section of E60 within Georgia runs almost 400km from the Red Bridge at the Azerbaijan Border to the Black Sea port of Poti and consists of two lanes of narrow (often only 7m [23’] wide without shoulders) and winding roads. It represents around a quarter of Georgia’s international road network and accounts for half of the country’s international journeys. Average traffic is around 7,800 vehicles per day of which 69% are cars, 19% are pickups or minibuses with buses and medium trucks accounting for another 6% and heavy or articulated trucks making up the remainder.

Outside of the Georgian Capital, Tbilisi, the existing road follows the old route which connected one town and village to the next and therefore all traffic goes through each settlement, making for long transit times and heightening the risk of accidents. Progress has been made in that from a peak of 16.8 road deaths/100,000 inhabitants in 2009 Georgia's fatality rate has dropped back to 11.7 deaths/100,000 inhabitants in 2011. Even at that level the fatality rate remains significantly worse than the EU countries and means there is scope for further improvement.

Under the plan approved by the World Bank the road is being upgraded to a new four lane concrete highway and while some resettlement is required along the route, the new road is designed to bypass most settlements. When it is completed the new road will allow quick and safe movement of people and goods between the Black Sea ports and the borders with Armenia and Azerbaijan. Additional funding will help finance the rehabilitation of about 450km (280 mi) of priority secondary and local roads throughout the country that are currently in poor condition.

Back in 2006 when the first contracts were being awarded, Georgia's domestic contractors did not have the experience of building road to the required standard. This has resulted in a number of international contractors from Germany, Israel and beyond constructing various sections of the road. While the E60 project is advancing well with only around 100km (62 mi) of roadway yet to be contracted, it will be 2020 before it is finished because the remaining sections run through the mountains and will involve bridge and tunnel building. Additional financing was required for the upgrading of the existing

Rikoti Tunnel (143km [29 mi] west of Tbilisi) and some repairs have also been required on newly laid sections of the road.

NEW SECTION UNDER CONSTRUCTION

One of the latest sections under construction, a 19km (12 mi) stretch some 95km (59 mi) to the west of Tbilisi where the two-lane asphalt road is being upgraded to four lanes. The initial part of the section follows the old route and is being constructed alongside the existing carriageways but the new road detours round a small village rather than passing through. Within the 19km (12 mi) section are five intersections and with two lanes plus a hard shoulder the carriageway width is 11.5m (37.75') and extends to 12.25m (40') for the lead-off and lead-on ramps. Some vertical realignment is required although generally it crosses reasonably flat terrain.

Chinese contractor China Nuclear won the contract to build and rebuild this section of the road and has combined its own 86-strong management team with local workers to operate the machinery on site. The road is being constructed using two-layer concrete slipform paving in order to utilize locally available aggregates. A 21cm (8.25") thick lower layer contains locally produced round river aggregates





and river washed 'brown sand' while the 7cm (2.75") upper layer uses higher quality crushed aggregates. Both the top and bottom mix concrete is prepared at a nearby batching plant which is run by Heidelberg Cement.

The road is one of the first to be built using Guntert & Zimmerman's (G&Z) latest S850SL slipform paver. According to G&Z president Ron Meskis, "This particular arrangement uses two S850SL slipform pavers one behind the other and both have been modified for this job. The front paver finishes the bottom slab and is equipped with both dowel bar and tie-bar inserters to position the bars at the required depth. A concrete pass-over transfer belt is also fitted to the first machine to feed the top-mix material to the second S850SL paver following immediately behind."

Fitted to the second S850SL are vibrators with adjustable vibrating force and these are set to consolidate the material without disturbing the dowel bars and tie-bars inserted into the bottom layer moments earlier by the lead machine. To produce the required surface finish, the second machine is equipped with G&Z's heavy-duty Oscillating Correcting Beam (OCB) and is followed by a Final Finisher. Following the paving train is G&Z's TC1500: Texture Cure Machine fitted with burlap to texture the surface and to apply the curing compound.

TWO-MACHINE VS. ONE-MACHINE TWO LAYER CONFIGURATIONS

Two-machine arrangements are around a third more expensive than the more common configuration of a single lift machine with a pass-over conveyor and additional framework to carry a second

paving kit to add the top layer. However, mobility considerations led the contractor to settle on this configuration because it is easier to transport two relatively small and flexible machines than one very large special piece of equipment which has to be dismantled for each move. Also, the two machine arrangement offers the contractor better options for the resale market.

G&Z CHOSEN FOR VERSATILITY AND PRODUCTIVITY

The SL designation in the S850SL's model name denotes that the paver is equipped with swing legs. In this particular project the swing legs allow the contractor to change the configuration in minutes and widen the tractor from the 11.5m (37.75') for the main carriageway to 12.25m (40') by swinging the legs and tracks outwards on one side.

China Nuclear also specified the machines with G&Z's telescopic end sections which allow rapid width change of up to 1.25m (4') per side. In combination with the swing leg feature, this enables the contractor to quickly change (in less than 30 minutes) from the 11.5m (37.75') width of the main carriageway to the 12.25m (40') specified for the lead-on and lead-off ramp sections. These features dramatically reduce the time to change width at the off- and on-ramps. Meskis said this can save between a half and a full shift each time the width needs to be altered.

Following immediately behind the rear paver is a G&Z TC1500 texture cure machine which adds curing compound to the surface of the slab. This slows the drying process and gives the mix time to build up enough strength to ward off any stresses caused by the



shrinkage of the concrete in the drying process. The chances of concrete cracking reduce significantly if proper curing procedures are followed, added Meskis.

TECHNICAL SUPPORT & INTELLIMATICS™

As technical support may not be as quickly on hand in Georgia as it is in G&Z's native US, the lead machine is one of the first to be fitted with the company's new EGON IntelliMatics™ system. EGON IntelliMatics interfaces with the standard engine diagnostics, monitoring and CAN Bus systems to monitor almost all of the machine's instrumented electrical and hydraulic parameters. That data can then be transmitted from machines anywhere in the world back to G&Z's headquarters in America using either Wi-Fi or GSM connectivity.

Should the onboard systems detect a fault EGON will automatically send an email alert to both the user and G&Z. Meskis said, "Very often we will know about a problem or an impending problem before it comes to the attention of the operator on site. If a problem does arise, our technicians can look at the transmitted information and advise the people on site what the trouble is, where it is located and how they can fix it."

He added, "In many instances our technicians can advise those on site to make adjustments, change a filter or faulty component thereby preventing the situation from deteriorating to a point where production will be interrupted. And in the worst case if an engineer has to be sent out they will arrive at the site knowing what the



problem is and will have come equipped with the tools and spares to do a fast single-visit repair.”

The EGON unit is fitted on-line and shipped with its modem only requiring the appropriate SIM card to be inserted to complete the connection. Diagnostics aside, this combination of machinery means an 11.5m (37.75’) wide two-layer road, with different mixes complete with longitudinal and transverse dowels, can be paved in a single pass. The ability to use different material specification for each layer is being fully exploited to minimize cost and utilize local produce by including ‘brown sand’ and different aggregates in the mix.

SLIPFORMING IN EMERGING MARKETS

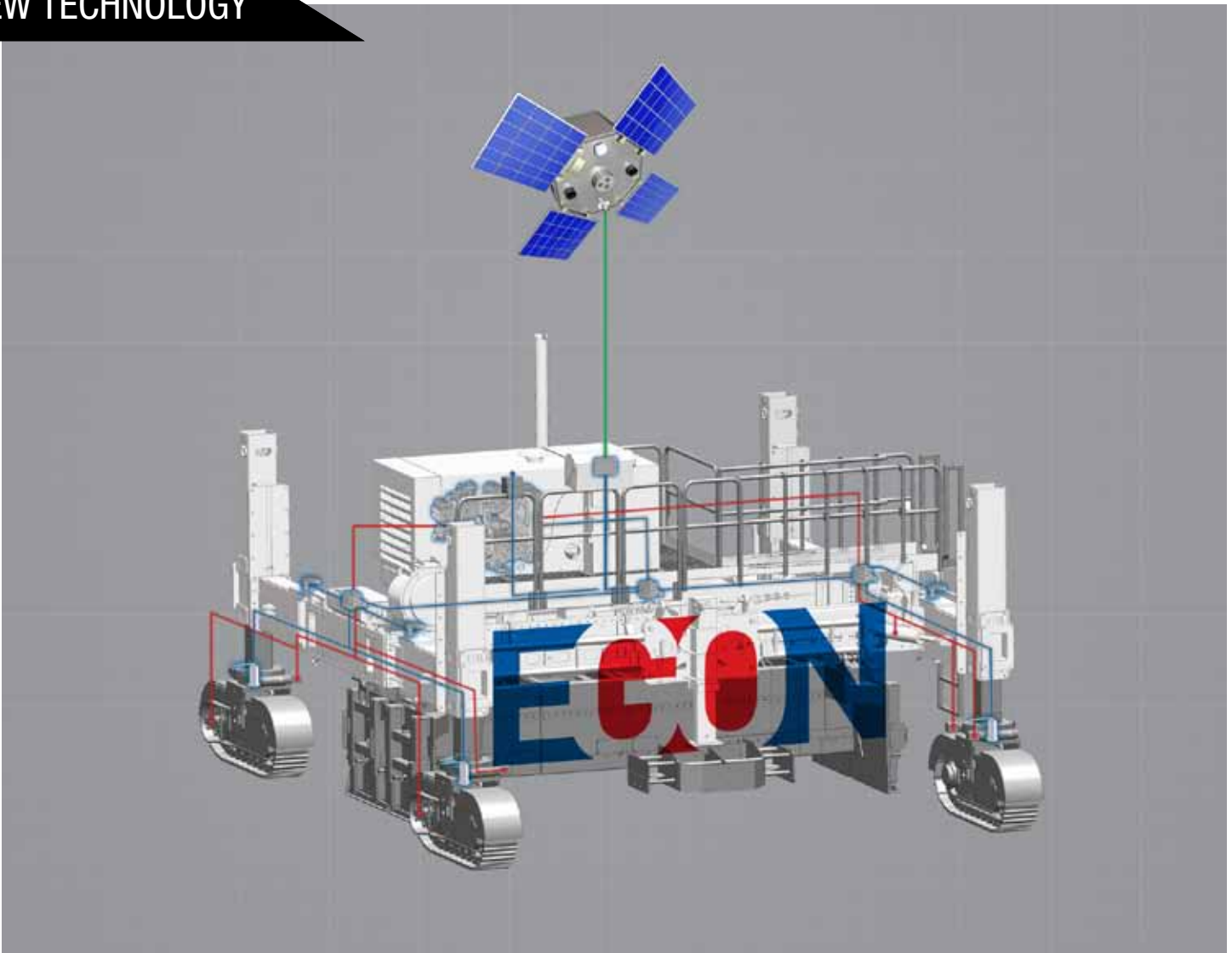
Theoretical paving speeds on the S850SL can easily surpass one meter/minute which in this case would require some 200m³ (218 cyd) of concrete/hour with a 3:1 split between the lower and upper

layer specification materials. The concrete is produced by two twin twinshaft mobile batching plants: a Meka MB-135BM and a Euromix 140 which have both been modified for this project by increasing the capacity beyond that of the standard product. One of the key challenges face in emerging slipform markets is the lack of adequate concrete production. The G&Z technical staff worked with China Nuclear to ensure the production levels would meet demand before the proper paving operation began.

With a combined capacity of 275m³/hr (300 cyd/hr) these batching plants have ample capacity. “In planning for how much concrete we need in front of the paver to sustain a certain production, we usually figure on 75% of the peak capacity as being the sustainable production rate and that’s not usually far off,” Meskis said.

G&Z is committed to the worldwide market not only by supplying machines but also, by sticking with our customers with technical paving process support. G&Z views its customers success as its own success.





EGON: SERVICE EYE IN THE SKY

What is the value of a machine that can instantly communicate with a project or equipment manager, service technician or operator to let them know that all is working within established parameters? Better yet, what if it were to notify them when a small issue occurs, so it can be addressed before a major downtime event arises? As concrete paving contractors will attest, paver downtime can result in the loss of hundreds of thousands of dollars and lost paving days, and G&Z's number one priority is to limit this loss.

This is the promise of Guntert & Zimmerman's EGON (Equipment Guidance and Operation Network) system. Introduced this spring at bauma 2013, EGON adds remote interface and diagnostics to the company's tried-and-true onboard Plus+1 machine control system for all of G&Z concrete paving equipment. "The system offers real-time connectivity to the paver via a Wi-Fi or GSM connection

from anywhere in the world," says Ron Guntert, CEO of Guntert & Zimmerman Const. Div., Inc.

Paving contractors already have experience using G&Z's Plus+1 control system for paver configuration and operation and for the use of a third-party stringless paving system. EGON pulls everything together in an easy to use system and includes the industry's most advanced diagnostic systems to simplify paver service, offer real-time connectivity and improve paver performance.

INTELLIMATICS™

The new EGON system takes the concept of telematics — monitoring engine functions to catch small issues before they become major

problems — and expands this to all aspects of machine operation. According to Frank Flores, CEO of Flores Automation and partner with G&Z on the IntelliMatics system, nothing on the market comes close to the depth of monitoring, reporting and diagnostics capabilities as offered by EGON. Guntert adds, “We use the term IntelliMatics to describe the depth of the system’s capabilities.” At the heart of the system lie Sauer-Danfoss controls that monitor machine performance. An environmentally sound, sealed PC is tied to the machine’s existing CAN Bus connection for monitoring.

An LCD display is mounted above the operator’s console, which allows the operator to control machine functions and view machine performance. The antiglare, high-resolution screen features sensor-controlled backlighting to ensure optimum viewing in all lighting conditions, even direct sunlight. The entire operator’s console, including LCD display, comes in a compact package that can be easily moved along the hand rail of the operator’s platform.

As part of EGON’s expanded diagnostics/monitoring system, G&Z’s engineering team designed a web based remote user interface to

enable connectivity to the paver from anywhere in the world. This enables input output monitoring, remote troubleshooting, error code reporting, machine location monitoring, data logging, maintenance reminders and remote setting changes, as long as a person has a Wi-Fi or GSM connection. “It’s the closest thing to having a mechanic on the machine without him/her traveling to the jobsite,” says Flores. EGON consists of seven segmented controller groups — left machine side, right machine side, power unit (engine) and four to monitor the toggle switches on the operator’s console. Creating these segmented groups offers a clean, modular design that results in less wiring and easier diagnostics. “Maximizing paving uptime is the key behind EGON,” says Guntert.

Once EGON detects a system fault or a component operating outside of set parameters, the fault is immediately emailed to the customer and G&Z. “For example, if a stringline sensor, pressure transducer or any other component on the machine fails,” says Flores, “G&Z may notice this before the operator does, and the crew can be notified to take corrective action.”



BOOSTING EFFICIENCY

When logging into EGON via the internet, the main screen shows the seven controller segment groups. For easy troubleshooting, the group where the error occurred will show in red, whereas all the other groups will remain green to indicate there is no issue.

Navigation throughout the web based interface is easily handled by a series of tabs at the top of the page and covers critical machine functions ranging from steering and elevation to speed and slope. “These are the four diagnostic screens that help companies and operators to improve machine performance,” mentions Flores.

The system will report if the machine is not performing within set parameters, and allows an authorized person to remotely adjust settings such as the speed output of a track or the elevation to get better ride numbers. “The information provided by EGON is a powerful tool to help contractors lay a better road surface and save money,” comments Flores. “For instance, if the elevation valves were

to fall outside of set parameters and the operator wasn’t aware, this could result in the installation of a pavement not meeting a smoothness specification resulting in a “must” grind or even worse, removal and replacement of the pavement.”

EGON also monitors all hydraulic system and power unit functions. Service personnel can receive e-mail alerts as a reminder that service interval levels have been reached or an oil filter needs to be changed. The hydraulics page also monitors fuel level, so the maintenance technician can see when the paver is low on fuel and dispatch a fuel truck, even before the paving crew requests it.

The versatile reporting system also gives companies a valuable tool for machine management. System managers can download items such as fault history, engine data, machine run time and filter life as part of machine management tools to help the paver operate at peak efficiency. The system’s GPS page gives the precise location of the machine, so companies can keep track of their assets.

EGON is available for all G&Z highway and airport concrete pavers using the Plus+1 system and can be retrofitted to existing field units using Plus+1. Additionally, all G&Z placer spreaders and texture cure machines can be equipped with EGON.

“The sky is the limit with this system, and the potential customer savings over the life of the paver are limitless,” concludes Guntert. “EGON has taken machine connectivity and remote diagnostics to the next level.”



G&Z IS ALWAYS ON SITE WITH EGON



EGON

**EQUIPMENT GUIDANCE
& OPERATION NETWORK**

G&Z's EGON IntelliMatics™ is *the first in-depth remote monitoring and diagnostics system in the concrete paving market*. With EGON, G&Z Service Technicians can remotely troubleshoot equipment issues from anywhere in the world, helping contractors Maximize Available Paving Time and Minimize Everything Else. EGON gives contractors peace of mind no matter how remote the job site or how critical the schedule.

CONTRACTOR INSPIRED. **GUNTERT** ENGINEERED.



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