Tetrus, the future for passenger information technology

One solution – infinite possibilities

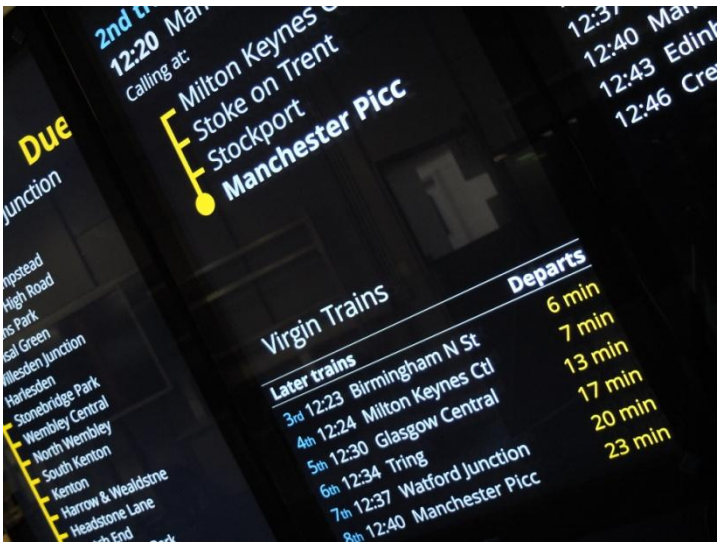
By Richard Colpman, Tetrus Product Manager for Infotec Ltd.

Introducing Infotec

Infotec Limited has been designing and manufacturing passenger information displays in Leicestershire, England since 1992. In that time the company has become the UK market leader and built an enviable reputation for the most reliable equipment with the longest service life. Indeed, there are Infotec displays still in constant service that were installed in the 1990s!

What makes a great passenger information display?

- Quick and easy to read
- Available 24/7
- Resilient to the elements
- Low maintenance
- Reliable and dedicated design
- Long & well-supported life span



Passenger information displays (PIDs) need to be clear and visible, so that a member of the travelling public can quickly and easily determine where he or she needs to be and when their chosen transport is due to depart. Often this means that the PID needs to be operational 24 hours a day, 365 days a year. The importance of reliability is furthered by the fact that the PIDs are sited in public places which, should the unit require servicing or repair, are difficult to access, causing significant disruption to the travelling public and great expense to the operator or maintainer. The locations are often outdoor locations where wind and rain as well as extremes of temperature are experienced.

This all means that much careful consideration has to go into the design and selection of materials and components that are going to produce our PIDs. Materials that don't rust or significantly degrade over time for the housing and the most reliable electronic and display components for the inside are used.

To ensure a premium quality product, Infotec carries out all of the design and manufacturing of the electronics sub-assemblies in-house. Whilst metalwork design is carried out in-house, assisted by our 3D CAD software, the manufacturing of housings, posts and bracketry, along with painting, is performed by carefully selected sub-contractors. By taking full responsibility for the design and

manufacture of its displays, Infotec effectively manages obsolescence over the lifetime of the product. Many of Infotec's products have remained in service well beyond their life expectancy.

At the heart of a PID is the unseen computer engine, also known as an embedded computer. This has a very specific task, entirely different from that of a modern laptop, PC or tablet with which most people are familiar. This is why Infotec has always chosen to design its own computers to ensure it provides the most appropriate solution for the passenger information display application concerned.

What does the future of passenger information displays look like?

- Full matrix LED
- High definition TFT
- Multi-media content
- Enhanced presentation

Traditionally, passenger information displays have presented text information, in a single colour (usually yellow), with a standard character height using rows of LEDs with spaces between the rows of characters. Sometimes there was a separate, but matching clock area in a larger point size. The computer-engine was designed accordingly with scalability to cater for the number of rows and columns of characters in the display concerned. Simple, highly reliable cable interfaces were employed to deliver the required schedule information to a display and a scripting method was devised to simplify and standardise the way in which the schedule information could be gathered from a central location and then transferred to each display in a particular network.

More recently, technological developments have seen the introduction of High Definition TFT displays and full-matrix LED displays (in both colour and monochrome). All of this has heralded changes in the content and style of presentation of passenger information (not all of it beneficial, especially where care is not taken to differentiate between true passenger needs and non-critical information).

Infotec's view is that both new and old-style displays should be driven in the same manner, whereby any PID can display any content or information that has been sent to it and that it shouldn't therefore matter to the operator which PID technology is in use in any given location. This approach required a very special computer-engine to be created, that would simplify the deployment of mixed display technologies in the future. After three years' development, Tetrus was born!

Why choose Tetrus for the new generation of PIDs?

- A dedicated PID computer-engine
- state-of-the-art micro-processor core
- Designed from the ground up for long-term applications

Tetrus is the name given to Infotec's latest version of its passenger information display computer-engine. The *Tetrus approach is to drive Infotec's newest PID ranges (LED and TFT displays) using the same computer core.* ***One solution – infinite possibilities.***

Tetrus has been designed by Infotec specifically for the purpose of driving passenger information displays. At the centre is a proven state-of-the-art microprocessor core that is used in applications as diverse as automotive computers, industrial controls, robotic systems and medical

instrumentation. All of these share the requirements that they must operate perfectly for very long periods of time and, once a new design has been tested and approved by an appropriate standards authority, items of exactly the same design can be manufactured for 10 years or more. It is for exactly these reasons that Infotec chose not to adopt a PC-based design!

Tetrus is not a PC-based design

- PID dedicated design (only include what is needed)
- Longer life components
- Extended operating temperature ranges
- Robust PID specific interfaces
- Long-term support

Tetrus has many advantages over a PC-based design when applied to passenger information displays. At this point, it is important to bring to mind what the primary design aim of a PC actually is. PC is the acronym for Personal Computer… a machine designed to assist us in our daily high-tech lives. It is a multi-purpose, multi-media, multi-tasking machine that we switch off at the end of the day. Have you ever heard of the saying: "A jack of all trades, but a master of none?" It really does apply to the PC.

PCs have also been designed "down to a price" to meet the market sector at which they are aimed. This might mean using cheaper electronic components with narrower operating temperature ranges, which in turn have been made with inferior grade raw materials to achieve the price-point. This all results in shorter operating lives, which are often acceptable to members of our throw-away consumer society that craves new "bigger, faster, better" devices every few years but not to commercial applications.

This general consumer world is not the one for which Tetrus has been developed. Components have been carefully chosen so that the same product can be manufactured for 10 years or more. High quality and extended temperature range components have been chosen over cheaper inferior ones, so that the resulting passenger information display will operate for many years to come in a range of environments.

Tetrus has been designed with just the right communication interfaces (including Ethernet and RS485) that are required for passenger information display application. In addition, specialist interfaces (such as Wi-Fi and GPRS) can be added by means of optional extra modules that are fitted in a robust and secure manner. These additional modules are also designed and manufactured by Infotec to the same rigorous standards, to ensure long and well-supported lifetimes that match the rest of Infotec's PID.

Tetrus is provided with dedicated PID software

- PID specific software
- No unexpected crashes, restarts, updates or viruses.
- Technology agnostic (LED, TFT, E-Ink)
- Low power graphical processing (no air-cooling required)

Any high-tech product relies as much on the solidity of its installed software as the electronics it runs on and this is why Infotec has produced its own software specifically for Tetrus. This furthers the '*One solution – infinite possibilities'* mantra and maintains compatibility with previous generations of

Infotec PIDs. This in-house software works in tandem with the electronics to provide a solid, embedded-computer system dedicated specifically to the provision of passenger information. There are no extra features that might one day cause the system to crash, restart or, worse still, to receive a virus from the Internet or cause the system to "go looking" for a software update on the Internet.

Tetrus is a professional PID design

- Reliability built into the design
- PID dedicated design
- One controller for LED, TFT and E-Ink

The resulting Tetrus computer-engine solution is what really makes Infotec's PIDs stand out as the professional choice for long-term reliable service. It is the same reliable engine in every PID, whether it is based on LED, TFT, a combination or even on E-ink technology (coming soon).

This computer-engine is cost-effective because it is designed exactly for the purpose, containing just the right interfaces and memory sizes to do the job. It's green too! The careful design ensures that the smooth sideways scrolling text and graphics are created intelligently and efficiently, so power consumption is kept to a minimum. PC-based systems will employ an overly high-performance and expensive PC processor with a graphics co-processor (that has probably been designed for gaming applications), which consequently draws vast amounts of power and requires constant "forced air-cooling". This implies the use of fans which include moving parts that have a finite life-expectancy. Remembering that PIDs are often sited outdoors means that the alternative PC system will need to include extended temperature range components which further increase both its cost and the stress on the forced air-cooling requirement, which in turn will reduce its in-service life.

Tetrus has its own 'self-healing' technology

- Failure modes designed in
- Software and circuitry monitor health
- Self-healing technology

The Tetrus engine goes further… in addition to its standard wide-temperature components, low power consumption, solid-state design (i.e. no moving parts), it features a built-in "self-healing" design concept. With Infotec's vast experience of PIDs, the designers considered all-known failure modes during the conception of the new Tetrus design. This led to the inclusion of both software and circuitry to monitor its own health and to self-heal in the unlikely event that any issues are found. Whilst occasionally similar solutions are offered as "bolt-ons" to PC-based systems, they are generally not built-in standard designs and nowhere near as effective.

Tetrus is easy

- No software licence labels, updates or repeat costs
- Reduced active maintenance
- No licence stickers
- No upgrade conflicts
- No additional application software updates
- No unexpected updates
- No keyboard reboots

Tetrus solutions are delivered ready-to-go and optionally fully-programmed and configured for the particular location at which they are to be installed. There are no licence sticker requirements, no need to record licence keys or to install application software with limited runtimes! Very often, PC systems have these requirements as well as additional periodical software licencing costs, that at best need to be actively managed and, at worst, increase the whole-life cost of each PID dramatically as well as leading to down-time whilst expired licences are being renewed!

Tetrus will not automatically search for updates, simply because none are needed. It will work seamlessly in exactly the same way for many years from the day it leaves the factory. Should an operator wish to add a newly-offered feature at some point in the future, then a web, server or cloud-based software application - such as Infotec's Javelin - can deploy the new software to a given PID or any number of them. It will control the moment of switch-over at a time to suit the operator. PC-based systems, especially those running a Windows operating system, are renowned for searching for updates and then finding them incompatible once the update has been installed. The result can be an inconvenient text box in the middle of the screen or worse-still the famous "blue screen of death", rendering the PID useless until a service engineer has attended and re-installed the software.

Getting a little more technical, the way in which some PC operating systems function does require system re-boots from time to time or user input via a keyboard. This can be extremely difficult and inconvenient when there is no user (in the laptop computer sense of the word) and the PID is hanging seven metres up in the air! This is further complicated by the lack of a convenient reset button, let alone a place in which to plug a keyboard!

Tetrus, however, can diagnose faults, 'self-heal' and, where necessary, restart itself without the need for user intervention.

Tetrus is for everybody

- Text to speech
- User configurable fonts / graphical symbols
- Sensor systems to ensure correct brightness

It's very important to remember that passenger information is essentially a text-based system. Great care should be taken to ensure legibility at an appropriate distance for the particular site. Also, requirements for converting text-to-speech exist to help visually impaired people and this facility is an option on all Tetrus systems. It features an extremely clearly spoken English language (at the time of writing, other languages are being developed).

Displays need to be capable of being seen in bright sunlight, but then turned down at night. Tetrus does this by monitoring both the ambient light and the brightness of the display, so that in the case of TFT displays, the power to the backlight can very steadily be increased as the TFT's backlight ages, which optimises both the visual performance and lifetime of the PID.

Tetrus has low data demands

With the migration (in some areas) of PIDs from simple, single-coloured text to full-colour, high resolution graphics with video clips or adverts, there is a possibility that the existing infrastructure will fail to cope with the increased amount of data required by each PID. Infotec's open-concept for Tetrus (in conjunction with the Javelin back-office software application) means that adverts are stored locally, within the PID. The sequence and timing schedule of adverts and information is configured by the operator. New adverts are downloaded when the system is "quiet" (for example in the very early hours of the morning) and this helps overall demands on data to be spread-out and kept as low as possible.

For general messages, the basic text data, with service times etc., is sent in a simple open-format protocol whereby the Tetrus computer-engine in each PID receiving the message knows how to interpret and display that message for the type of display media (LED or TFT etc) that it has in front of it.

This approach means that (getting technical again) Tetrus-based PIDs can be connected to the control centre via any of the commonly used interfaces including RS485, Ethernet, Wi-Fi and mobile phone GPRS. Of course, the performance of Wi-Fi or GPRS systems will depend on the quality and "availability" of the local network, far more so than conventionally wired systems.

Tetrus is a long-term solution

Infotec's design aim for Tetrus is that it will still be available and applicable in 2025 and probably beyond. The latest industrial versions of PC-chipsets will be obsolete within seven years due to the PC-chip-makers' production cycles. From release of the new chipset, PC board manufacturers must design, test and produce their motherboards before releasing to the PID industry first. The PID industry will then have its own design cycle and approvals timescale before being ready to offer a "new" solution for sale. Add to this the long project timescales associated with operators purchasing and installing PIDs and the "new" PC-based solution will most probably be two generations old with only another three years until end-of-life.

As a result, it is highly unlikely that an operator will be supplied with identical hardware, should an extension to the installed estate be required in the future. This will have repercussions when it comes to the increased numbers of and variance in PC board spares.

Furthermore, the understanding of the differences between the boards in terms of both fitting and cabling as well as the software drivers required for the variance in chipsets becomes difficult to manage. This is before changes in versions of operating system and revisions to third party "signage" application software have been considered.

By design, Tetrus has all the required parts soldered to the board. Many PC-based solutions incorporate the flexibility of plug-in memory and storage modules. This is great for your desktop PC, but could be a problem in a PID. Will the PC-based option survive being subjected to regular vibration (whether due to passing trains, being on rolling-stock or mounted near a bus diesel engine)? Will the next generation of PC-board use the same memory? The answer to both questions is 'unlikely'.

On the subject of vibration, Tetrus has been tested to the EN51055 railway standard for rolling-stock. So, whether you have an on-board/moving or on-station/static PID application, you can rest assured that it won't fall apart…. it's all in the detail of the design! Can you be sure the same applies to a COTS alternative?

Customer Approvals

Infotec is rightly proud of its production facility in Leicestershire, which has been inspected and approved by a number of notable passenger information system solution providers before they have become its long-term partners. Prospective customers are always welcome to visit Infotec for themselves to see why Tetrus will be the first choice for passenger information displays.

Further questions?

If this article has left any unanswered questions in your mind, or you require further details on the solutions that Infotec has to offer, please either visit the website www.infotec.co.uk , contact the company by telephone on +44 (0) 1530 560600 or by email to info@infotec.co.uk.

Tetrus: One solution – infinite possibilities!