

Case Study:

Results of tool tracking
system implementation at
Agrium Chemical Plant

Independent Research by



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The Toolhound™ III barcode asset management system for tracking personal protective equipment & tools in the Agrium factory

Enabling technologies in this case study

Bar codes, handheld, wireless transmission barcode scanners, wireless LANs (local area networks).

An overview of the Houndware Toolhound™ III system employed at Agrium

The Houndware system is employed by the Environment, Health and Safety Department at the Agrium production plant in Fort Saskatchewan, Alberta, Canada. This department is responsible for the issue of all personal protective equipment, general safety equipment such as fire extinguishers, tools and equipment and maintenance consumables, used in the day-to-day running of the Agrium anhydrous ammonia and urea production plant.



The total inventory, described above, is catalogued in the HOUNDware Toolhound database, which is located on two desktop computers – 1 for safety equipment and 1 for tools. Each item is identified by a barcode. Every worker has a unique ID badge



A distribution centre operative, using a wireless handheld barcode scanner records each withdrawal or return from the project inventory.

The data is transferred through a wireless local area network to the central database in real-time, so that the history of every item and every worker is instantly available.

Numerous reports relating to such criteria as product, individual, job discipline, plant area, item price, overdue returns or low inventory level, can be automatically generated the database.

The Client: Agrium Inc

Agrium Inc. is a leading global producer and marketer of fertilizer and a major retail supplier of agricultural products and services in both North America and Argentina.

The Fort Saskatchewan plant, shown below, produces anhydrous ammonia and urea products for a diverse range of uses including the production of lawn, garden and forestry fertilizers, resins, glues, plywood, fibreglass insulation, animal feed supplements and de-icer. The total annual production capacities at Fort Saskatchewan for anhydrous ammonia and urea are 465,000 tonnes and 650,000 metric tonnes respectively. The 2001 turnover of Agrium Inc was \$2.1billion US



For more information about Agrium see www.Agrium.com/

The technology provider: HOUNDware Corporation

Agrium Inc employs the HOUNDware Toolhound III asset management system for day-to-day management of the issues and returns of tools and equipment, maintenance consumables, safety equipment and personal protective equipment (PPE) on this project. Toolhound III is also used by the Environment, Health and Safety Department to manage the testing, certification and maintenance of items in this inventory.

The HOUNDware Corporation has been established for over 16 years. They provide solutions based on bar code and portable scanner technology to help clients control and monitor their assets, such as tools, equipment and consumables, in real time. They have completed over 300 installations worldwide and clients include Bechtel Corporation, The Ford Motor Company and Air Canada.

They offer 3 different asset management solutions:

Tool Hound III, which is designed for single-store applications such this Agrium case study

HOUNDware Onsite, which operates on a company's own intranet/network and is scalable from an individual desktop computer to an enterprise wide solution. (See the AGRIMUM case study in this BSRIA series for data on this solution)

HOUNDware Online, which delivers applications via the Internet. This system enables asset management on multiple, geographically dispersed, construction projects within the same organisation. Instead of paying upfront for software licences, buying and maintaining servers and hiring applications and administration experts, HOUNDware provide all of this for one monthly fee, starting at £140. .

For more information about Houndware see www.houndware.com/

Key statistics and feedback from the site study

There are 485 people identified in the HOUNDware database at this Agrium production plant. This increases to 1500 people during planned shutdowns for maintenance and renovation. Each person has a unique identification number with which they interact with the Agrium asset management system

There are 60,000 items stocked in the tools and equipment inventory at this Agrium production plant. This inventory is valued at £600,000

There are 10,000 items stocked in the personal protective equipment (PPE) and safety inventory at this Agrium production plant. This inventory is valued at £340,000

During normal operation of the Agrium production plant, there is an average of 140 tool and equipment, issue or return transactions each working day. This increases to over 800 transactions per day during planned shutdown periods for maintenance and renovation..

During normal operation of the Agrium production plant, there is an average of 12 Personal Protective equipment, issue or return transactions each working day. This increases to a peak of 300, and an average of 250, transactions per day during planned shutdown periods for maintenance and renovation.

There are 4 wireless-enabled barcode scanners used by Agrium in the distribution centre on this project

The Environment, Health and Safety Department employs 4 people on this site to manage the provision all personal protective equipment, general safety equipment, tools and equipment and maintenance consumables.

HOUNDware Toolhound™ III implementation costs on this project

Since first implementing the HOUNDware Toolhound™ asset management system at their Fort Saskatchewan plant in September 1989, Agrium has purchased **£60,300** worth of products and services from HOUNDware. These products and services include the Tool Hound software and related upgrades, barcode scanners, wireless LAN access points and Ethernet hubs, polyester

and aluminium barcode labels, software customisation services and annual maintenance and support agreements.

This £60,300 investment averages out at **£4638 per year**, over the 13 years since initial installation. However, now that the system is mature and fully meets the Agrium's needs, the recent annual expenditure levels have been below this figure.

The typical elemental costs of these products and services are given in the table below:

HOUNDware Toolhound III system component description	Unit cost
1. HOUNDware Toolhound III software licence for the Environment, Health and Safety Department at Agrium, Fort Saskatchewan: £4550 base price + £1590 per additional outlet location = £4550	£6140
2. HOUNDware maintenance module : £1400	£1400
3. HOUNDware software maintenance licence for the project = 15% of (£6140 + £1400)	£1130 per year ongoing
4. Dolphin 7400 wireless scanners operating Windows CE with charging station @ £1750 ¹ each. (4 currently being employed)	£1750
5. Symbol Spectrum24® High Rate 4121 Wireless LAN Access Points @ £850 ² each (2 currently being employed)	£850
6. Ethernet hub ² (1 currently being employed)	£1500
7. Desktop computers @ £1000 each (2 currently being employed)	£1000
8. Training by HOUNDware personnel @ £430 per day	£430 per day
9. Consultancy and customisation services by HOUNDware personnel @ £430 per day	£430 per day
10. Site installation by 2-man HOUNDware systems integration team @ £430 per person per day	£860 per day
11. Provision of polycoated, self-adhesive barcode labels by HOUNDware (100,000 used in 13 year life of this installation)	5,000 labels = £605 10,000 labels = £790 20,000 labels = £1075
12. Provision of anodised aluminium barcode labels by HOUNDware (8,500 used in 13 year life of this installation)	100 labels = £605 500 labels = £790 1,000 labels = £1075

Business benefits analysis of HOUNDware Toolhound™ III at this factory

The benefits generated by the use of HOUNDware Toolhound™ III on this project have been analysed with respect to the following 3 key business areas:

The personnel working in the tool and equipment distribution centres

The Agrium workforce and management

The central office and associated back-office functions

Distribution centre personnel benefits

¹ Average price from National Barcode <http://www.nationalbarcode.com/> and Liberty Systems <http://www.liberty-sys.com/>

² Price at Mobile Planet <http://howtobuy.symbol.com/>

The Agrium team stated that the replacement of the old paper chit system by Toolhound III has enabled them to run the Environment, Health and Safety Department with one less person.

At an average hourly rate of £13 per hour, and a standard working year of 350 days, this is an annual saving of :

1 person x £13 per hour x 8 hours per day x 350 days per year = **£36,400**



Several independent studies have concluded that error rates for data entry using barcodes are between 1 in 1 million and 1 in 3 million characters. In contrast, these studies have shown that manual data entry by humans has an error rate of 1 in 300 characters³. It is evident that with approximately 70,000 transactions taking place annually on this site, there are data integrity, as well as process speed, benefits of automatic identification and data capture. The Agrium team confirmed this.

The Agrium workforce and management benefits

The Environment, Health and Safety Department stated that during the first 12 months that HOUNDwareTool Hound III was employed at this production plant, they saved £37,000 in reduced tool and equipment inventory loss, when compared to the preceding 12 months. They confirmed that the instant accountability generated by the system therefore is a very powerful tool in minimising these profit-inhibiting losses.



The time spent by a construction worker at the tool and equipment distribution centre is divided into two parts:

1. Time spent in a queue waiting for their turn at the service window.
2. The duration of their own transaction

³ www.aimglobal.org

The Agrium team stated that with their old paper-based administration system, unit transaction time for inventory withdrawals and returns was in excess of 2 minutes (120 seconds). With the Toolhound III system, this average time has been reduced to 60 seconds.

We can analyse the savings that this improved transaction time generates during the 20 days of plant shutdown, when there are 1500 people on site:

During the shutdown period, there is a peak of 1100 storeroom transactions per day. Feedback from the Agrium staff, together with BSRIA observations, indicates that a worker undertakes an average of 2 transactions in each visit to the storeroom. This means that the total number of daily visits to the storeroom is $1100/2 = 550$

The time savings generated for a construction worker are therefore as follows:

Waiting time saving = Duration of 2 transactions for the person in front in the queue
 $= 2 \times (120-60) = 120$ seconds

Own transaction time saving = Duration of their 2 transactions = $2 \times (120-60) = 120$ seconds

Total time saving per visit = **240 seconds**

The total time saving for workers during the critical shutdown period is as follows:

550 visits per day x 20 days shutdown period x 240 seconds time saving per visit/ $3600 = 733$ **man-hours time saving**

This translates into the following cost saving during this period:

550 visits per day x 20 days shutdown period x 240 seconds time saving per visit/ 3600 x $\pounds 15$ per hour tradesman wage = **\pounds 11000**

It is important to note that because HOUNDwareTool Hound III enables accurate monitoring of peak consumption rates and stock levels of tools, equipment, maintenance consumables, safety equipment and personal protective equipment (PPE), it plays a key role in ensuring that delays are not generated through the non-availability of specific items.

The Agrium team stated that this was particularly crucial during planned shutdown periods when safety equipment and tools must be available. If maintenance work overruns, then each lost day's production output is valued at over **\pounds 340,000**

BSRIA research over the last 7 years has shown that on a typical construction project 1% of the average working day is lost due to delays associated with plant, tools and equipment not being available.⁴ During just the 20 days duration of planned shutdown periods typically taken at this Agrium plant, this would equate to the following inefficiencies:

1500 people x 20 days x 8 hours per day x $1\% = 2400$ **ineffective manhours per, waiting for plant, tools and equipment or**



⁴This 1% average figure is normally characterised by a few periods of zero output lasting 1 hour – 8 hours, rather than many small delays of several minutes. In addition, 7% of the average working day on a construction project is spent collecting materials, tools and equipment

1500 people x 20 days x 8 hours per day £15 per hour x 1% = **£36,000 in ineffective manhours costs, waiting for plant, tools and equipment.**

During just the 345 days of normal operation when 485 people are operating and maintaining the Agrium plant, this would equate to the following inefficiencies:

485 people x 345 days x 8 hours per day x 1% = **13386 ineffective manhours per, waiting for plant, tools and equipment or**

485 people x 345 days x 8 hours per day £15 per hour x 1% = **£200,000 in ineffective manhours costs, waiting for plant, tools and equipment.**

Central office and associated back-office function benefits

The Agrium team confirmed that the accountability that the HOUNDware asset management system provides is crucial to preventing asset loss on the project. With an inventory of 70,000 items valued at £940,000, this is an important business driver for Agrium.

Also, the ability to generate instant stock reports, as well as numerous other reports for their own use and for presentation to other business units within the organisation, was very important for the Environment, Health and Safety Department.

They also highlighted the significant savings in paper storage space that a digital asset management system generates.



Safe working practices are extremely important at Agrium. In addition to managing the provision of safety equipment and personal protective equipment(PPE) at this site, the HOUNDware system, though its integrated maintenance module, also manages the testing, certification and calibration of equipment.

Work Order No.	4411	Status	Issued
Priority	Highest	Type	Scheduled
Bar-Code No.	BARCAT - 1		
Requested By	Date: 01/16/2002	Scheduled Date	1/20/2002
Approved By	Date: 01/16/2002	Project	Logan
Issued By	Date: 01/15/2002	User Field 1	
Closed By	Date: 01/15/2002	User Field 2	
Task	Oil Change every 3 months	Vendor	Fuller & Co. Garage Inc.
Description	Oil Change every 3 months	Contact	
		PO No.	4411
		Phone	446-3801

Detailed feedback from the site study

Although the HOUNDwareTool Hound IIIsystem is an extremely powerful mechanism for controlled asset management, it was evident that the excellent level of storage system

organisation within both the safety equipment and tool distribution centres was a critical success factor. All item types were neatly grouped and stored in individual bins or racks and everything was clearly and simply identified.



Other critical success factors identified by the Agrium team were:

Personnel need to be identified within the database on the first day that they begin working on the site. There therefore needs to be an efficient link between the recruitment and payroll departments of Agrium and the contractors it employs, and the Environment, Health and Safety Department

Proper training in the use of the HOUNDwareTool Hound III system is required.

There must be a data back-up regime in operation .

Items with a unit value of \$25 Canadian dollars (£11), such as a gas mask, large spanner and fire extinguisher, were defined as a piece of equipment by the Environment, Health and Safety Department and had unique barcodes. Items with a unit value of below \$25 Canadian dollars, such as safety gloves, drill bits and marker pens were defined as commodities by this team, and either shared the same barcode or were tracked by box volume

The barcodes for the this Agrium site have been produced by HOUNDware for Agrium. Agrium was provided a sequential range of barcodes so that each new order of labels had unique numbers. .

Any additional project barcodes are produced in the same manner.



Technical details on the HOUNDwareTool Hound III system

HOUNDware Tool Hound III is designed for use in single store room applications.

Tool Hound III can also be used for multi-location operations, although HOUNDware onsite, which operates over an intranet, or HOUNDware Online, which uses the internet AS the key communications medium, would be more appropriate.



The key components of the parts of the Tool Hound system are a desktop computer, a wireless communication access point, hand held wireless barcode scanners, barcodes on the assets to be controlled and identity cards for the workforce.

The technical details of these components are given below:

Work Station Minimum Requirements:

- Pentium II 233 Mhz processor
- 32MB RAM
- 800 x 600 SVGA Monitor
- Hard Disk Space: 200 Mb or more available
- Windows 95 or NT
- CD Rom Drive
- Modem: Optional
- Mouse: Required
- CD-ROM: Required
- Speakers: Optional
- Serial Port: One available for program uploads to scanner or printer.

Wireless scanners

The scanners used on this project were Dolphin® 7400RF hand held portable data terminals manufactured by HHP. However, any wireless-enabled Pocket PC device can be employed.

The Dolphin® 7400RF devices were enabled with Microsoft Windows CE™ and included an integrated 2.4 GHz spread spectrum, DSSS (Direct Sequence Spread Spectrum) radio for real time data communication. They featured a full alphanumeric keypad, large quarter-screen display, high-performance Intel StrongArm processor, 64MB of memory, touch-screen, IrDA infrared data port, internal compact flash slot, and internal type-II PC-Card slot for 2.4GHz RF LAN or added memory.



Access Points

Symbol Spectrum24® High Rate 4121 Wireless LAN Access Points were employed at this site to connect the wireless hand held devices to workstation hosting the HOUNDware database.

These access points are designed to the IEEE 802.11b interoperability standards, which are the worldwide industry norm.⁵ Spectrum24 High Rate delivers data at up to 11 Mbps.



Bar Codes & Accessories

The HOUNDware system incorporates industrial strength bar codes and labels. Several types are available according to project specific requirements.

Polycoated, self-adhesive labels were employed on this project because they are a durable and economic solution. These polycoated and pre-printed labels work in most environments and can be rapidly and easily produced in large quantities.

In applications such as the spanners shown below, the Agrium team also used clear epoxy adhesive to ensure that barcode labels remained in place.



Ultra durable, anodised aluminium bar codes are also available and are designed to stand up to harsh environments and abuse.

The asset number, barcode, and company name are photographically imaged, dyed, and sealed within the aluminium, not just printed on the surface. The graphics are embedded beneath the hardened surface of the aluminum during the anodizing process, providing decades of asset protection.



Houndware Support Services

All HOUNDware customers receive 3 months of customer support after the initial purchase date of the HOUNDwareTool Hound III system. Entering into a support agreement can extend this period of customer support

⁵ For more data on 802.11 standards contact AIM – The global trade association for the automatic identification and data capture industries : www.aimglobal.org

Contact details for further investigation

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