# SMARTLOG: TRANSPARENCY AND ACCOUNTABILITY

The phrase "Trust but Verify," coined by the late US president Ronald Reagan, may be a remedy to social behaviors described in recent scientific research done by Dan Ariely, professor of psychology and behavioral economics at Duke University. In his research Ariely concludes that when minor infractions go uncorrected, they result in a large cumulative cost to the economy. His research shows that 40% of the general population commits such infractions routinely.

Traditionally when Irradiator downtime occurs, an operator writes the date and time into a paper logbook and later, when the machine is started, the date and time is entered again to calculate the total duration of downtime. When management wishes to see the total downtime over a specific period, a supervisor adds up all the time that machine was down and designates every occurrence of downtime as either planned or unplanned. This method is often inaccurate. Typically, actual downtime is underreported. This may be attributed to various reasons, including a delay in attending to unplanned downtime conditions having a negative impact on an employee's performance evaluation or simply trying to be considered of a co-worker's particular situation.

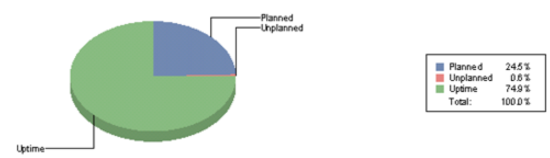
konnTRACK Process Control software includes SmartLOG, an electronic logbook that automatically generates machine downtime logs. Before the machine is re-started, the operator is required to allocate the downtime segment to a range of planned or unplanned downtime categories. This system eliminates the problem of under-reporting downtime and makes the employee more accountable reacting to unplanned downtime conditions.

| Shutdown D/T<br>Startup D/T<br>Downtime | Cycle Number<br>Up Hours (H.H)<br>Event ID | Operator Remarks<br>Primary Downtime Category Description<br>*Event Description* | Operator<br>Primary Category<br>Secondary Category |
|---|---|---|---|
| 01 Mar 2016 6:13:48PM<br>01 Mar 2016 6:23:43PM<br>00:09:55 | 1,077,060<br>4,528.2<br>184 | plastic guide left in tote<br>Planned - Powered Off<br>*Source Lowered by Keyswitch* | Andy<br>1,005 - 100% |
| 03 Mar 2016 4:08:32AM<br>03 Mar 2016 4:51:59PM<br>12:43:27 | 1,077,672<br>4,561.9<br>184 | Weekly checks, rollers replaced, lts replaced, air leaks x2 repaired, pool topped up.<br>Planned - Maintenance Planned<br>*Source Lowered by Keyswitch* | Alex<br>1,007 - 100% |
| 03 Mar 2016 9:12:19PM<br>03 Mar 2016 9:18:22PM<br>00:06:03 | 1,077,745<br>4,566.3<br>184 | removal of pde0715<br>Planned - Maintenance Planned<br>*Source Lowered by Keyswitch* | Stephen<br>1,007 - 100% |

**Figure 1: Electronic Logbook**

In addition, the system generates downtime reports for any time period almost instantaneously. This eliminates the need for any labor dedicated to generating the downtime reports.

**Operation Summary**




| Downtime Description / *Uptime* | Duration | Duration (%) |
|---|---|---|
| Planned | 7d 14:11:26 | 24.5% |
| Unplanned | 04:37:05 | 0.6% |
| *Uptime* | 23d 05:10:29 | 74.9% |
| **Total Duration** | 30d 23:59:00 | 100.0% |

**Figure 2: Uptime/Downtime overview**

Operations managers may be interested in how downtime is broken down by categories. This helps determine if any operational aspects need improvement:

| Category | Description | Duration | Duration (%) |
|---|---|---|---|
| 1,005 | Planned - Powered Off | 6d 01:09:42 | 77.7% |
| 1,007 | Planned - Maintenance Planned | 1d 12:54:45 | 19.8% |
| 1,501 | Unplanned - Cell Outfeed Conveyors - Tote Jammed | 02:44:22 | 1.5% |
| 1,232 | Unplanned - CIC - HP4 Conveyor Rollers | 01:14:02 | 0.7% |
| 1,201 | Unplanned - CIC - Tote Queue Fault | 00:21:23 | 0.2% |
| 1,116 | Unplanned - TLS - Operator Error | 00:17:18 | 0.2% |
| 1,008 | Planned - Off Carrier | 00:06:59 | 0.1% |
| | **Total Downtime** | 7d 18:48:31 | 100.0% |

**Figure 3: Downtime broken down by categories**

Lastly, maintenance staff can view downtime by the actual event that caused it. This is useful when planning maintenance activities, focusing first on the 20% of breakdowns which are often responsible for 80% of downtime.

**Events caused downtime**

| Event Number | Event Description | Occured | Downtime | Duration % |
|---|---|---|---|---|
| 184 | Source Lowered by Keyswitch | 36 | 1d 20:57:23 | 79.1% |
| 22 | Cylinder P4B moved very slow to discharge (21 seconds) | 1 | 03:45:23 | 6.6% |
| 97 | Tote 28 in Src Pass Pos 2 with exposure SN 72343 and maximum time tolerance of 1714 conflicts with the setpoint or accumulated cycle time of 1776 (10xs) | 1 | 03:25:43 | 6.0% |
| 131 | Building Power Fault | 1 | 02:23:59 | 4.2% |
| 105 | Overdose Fault | 1 | 00:58:47 | 1.7% |
| 22 | Cylinder P1B moved very slow to discharge (21 seconds) | 1 | 00:33:04 | 1.0% |

**Figure 4: Events that caused downtime**

Inevitably, transparent downtime tracking improves individual accountability and results in continually improving irradiator uptime.

Originally from Slovakia, Peter Veselovsky studied electrical engineering at the University of Toronto. An avid skier, Peter quickly fell in love with Canadian winters. While working with Nordion leading their Irradiator Control Systems and Radiation Therapy Control groups, he realized that the level of innovation was lacking. Peter believed it was possible to integrate sterilization control systems with a manufacturer's complex work flow while maintaining highly effective and safe systems that would meet stringent regulatory standards. With this in mind, Peter formed Konnexis in 2000. Today, Konnexis' handpicked team provides control systems and integration services for a variety of sterilization systems across the globe.

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