



# IMPROVING ASSET MAINTENANCE PRODUCTIVITY, SAFETY, and RELIABILITY

with Automated Work Order Packet Printing from  
Oracle E-Business Suite Enterprise Asset Maintenance



## Introduction

Enterprise Asset Management (EAM) systems and Computerized Maintenance Management Systems (CMMS) provide maintenance departments with the ability to manage and measure every aspect of their asset reliability program, helping organizations ascend the maintenance excellence pyramid. However, these applications, like most, have functionality gaps that limit your organization in realizing its full potential.

For maintenance organizations running Oracle E-Business Suite Enterprise Asset Maintenance (eAM), a functionality gap that users commonly recognize is the inability to print work orders with their associated attachments. In asset-intensive industries, maintenance departments bear the burden of ensuring the reliability of aging equipment. The key to keeping up with asset reliability is scheduling preventative and corrective maintenance, and providing maintenance crews with the documentation they need to be safe and successful at their jobs.

To assist with these processes, eAM includes a feature that allows users to attach documents to work orders, ensuring that relevant details for the work order are available for reference. For example, a work order may have instructions on how to balance tires (as a Microsoft Word document), a two-dimensional CAD drawing (as a .dwg file), and a picture of the equipment itself (as a .jpeg image).

But, a shortcoming in this feature surfaces when users try to print this **complete work order packet** that is inclusive of the work order and its associated attachments. This white paper walks you through the challenges of native work order printing and how an automated work packet solution can **improve productivity, safety compliance, and overall asset reliability by eliminating incomplete and incorrect work packets from making their way into the field.**

## Native Methods for Printing Work Orders in Oracle eAM

Oracle eAM provides two (2) user interface methods to create work orders and view attachments: Oracle Forms and Oracle Application Framework (commonly and hereafter referred to as “Self Service”). This includes files uploaded to Oracle, web pages, and files in third-party content management systems. For example, a work order for routine maintenance may contain drawings or supporting files, such as Material Safety Data Sheets or parts diagrams.

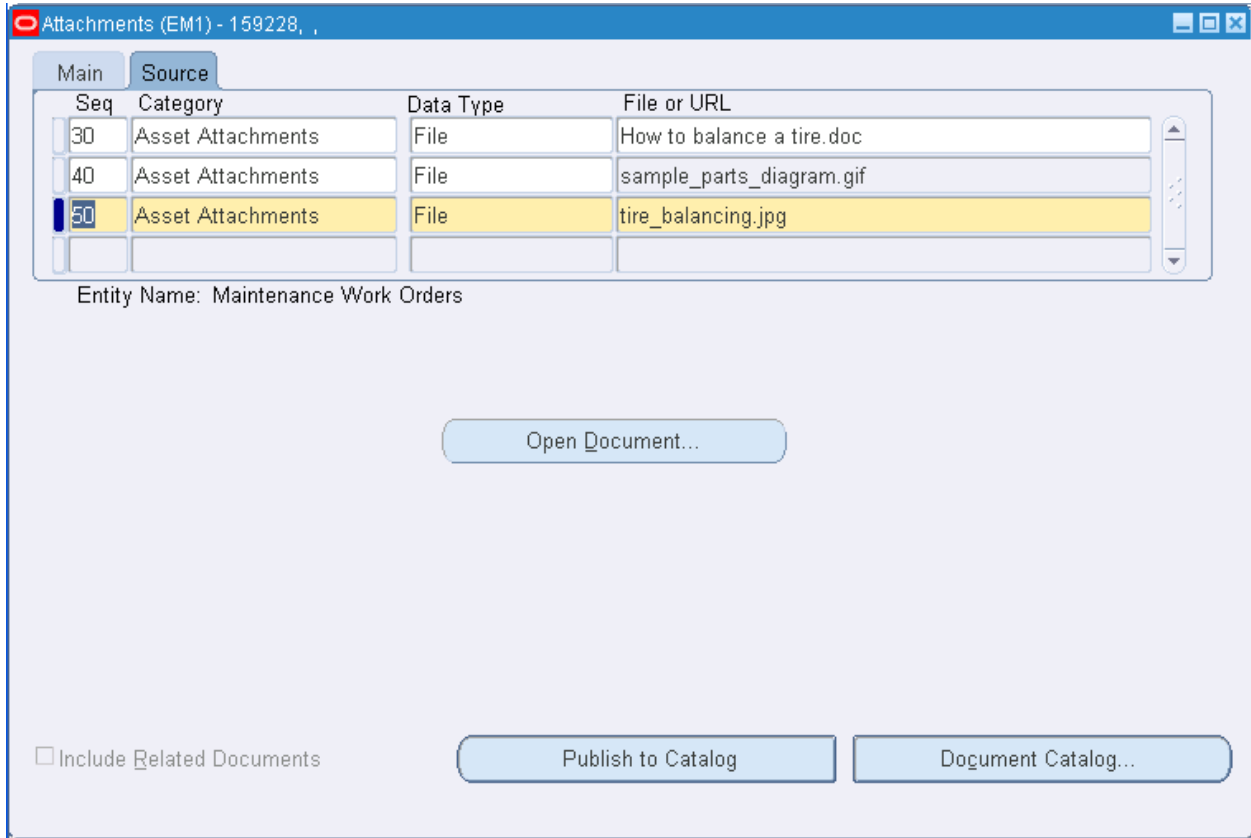
Both of these aforementioned methods provide access to work orders and the associated attachments; however, neither interface addresses the need planners and schedulers have for printing of a complete work order packet, inclusive of the attachment(s). This forces a high level of manual involvement in the process of assembling a complete and correct work packet. Mistakes in the assembly of one of these work packets can lead to safety and asset reliability issues, not to mention wasted time and resources that could be better spent on preventative maintenance planning.

### Method 1: Oracle Forms

While the forms-based method prints work order reports in 11i and R12, it lacks the capability to print associated attachments (**Fig. 1**). Instead, the file attachments are merely referenced in the work order report that is run as a concurrent request (**Fig. 2**).



**Figure 1:** Oracle Forms – Attachments associated with the work order are visible in the Attachments form



**Figure 2:** Oracle Forms – Work Order Detail Report also references the associated attachments

**ORACLE Enterprise Asset Management Maintenance Work Order Detail Report** Page 5

Operation Long Attachments

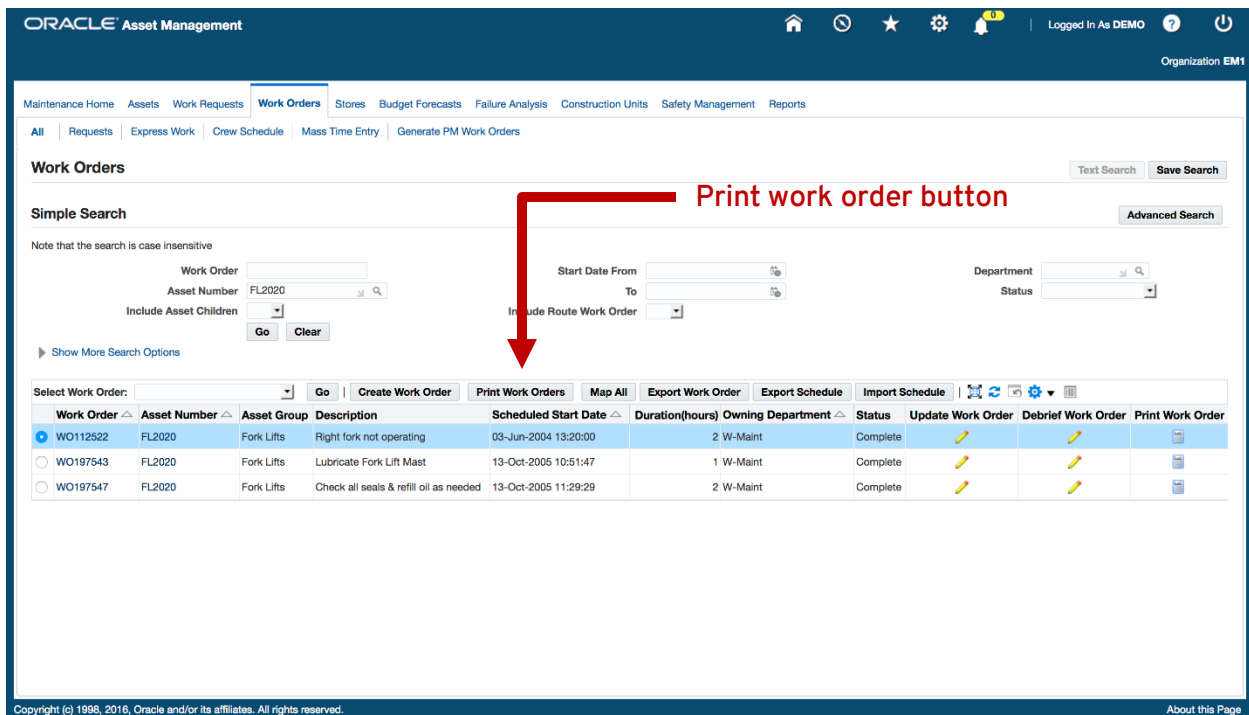
File Attachments

File Name	Description	Category
tire_balancing.jpg		Asset Attachments
How to balance a tire.doc		Asset Attachments
sample_parts_diagram.gif		Asset Attachments

## Method 2: Self Service

Previous eAM versions (11i) required users to exit Self Service and enter Oracle Forms in order to print a work order. This created inefficiencies for eAM users, and limited companies in their ability to manage user responsibilities within Oracle Forms. With the launch of R12, Oracle added the ability to print work order reports from Self Service (**Fig. 3**).

**Figure 3:** *R12 Self Service* introduces “Print Work Order” on the Work Order Search Screen



The screenshot shows the Oracle Asset Management interface. The top navigation bar includes 'ORACLE Asset Management' and 'Organization EM1'. The main menu has 'Work Orders' selected. Below the menu, there are search filters for 'Work Order', 'Asset Number', 'Start Date From', 'To', 'Department', and 'Status'. A red arrow points to the 'Print Work Orders' button in the toolbar above the table. The table contains the following data:

Work Order	Asset Number	Asset Group	Description	Scheduled Start Date	Duration(hours)	Owning Department	Status	Update Work Order	Debrief Work Order	Print Work Order
WO112522	FL2020	Fork Lifts	Right fork not operating	03-Jun-2004 13:20:00	2	W-Maint	Complete			
WO197543	FL2020	Fork Lifts	Lubricate Fork Lift Mast	13-Oct-2005 10:51:47	1	W-Maint	Complete			
WO197547	FL2020	Fork Lifts	Check all seals & refill oil as needed	13-Oct-2005 11:29:29	2	W-Maint	Complete			

Additionally, Oracle added the ability to preview the work order(s) in PDF format within Self Service (**Fig. 4**). From this point, a user can use Adobe Acrobat to print the work order(s). However, like the forms-based method, the PDF document only references work order attachments – **it does not actually include each attachment as part of the PDF document.**

Figure 4: R12 Self Service – Users can preview the Work Order; but, attachments are not printed (see Fig. 2)

The screenshot displays the Oracle Asset Management interface. At the top, there is a navigation bar with 'ORACLE Asset Management' and a user profile 'Logged In As DEMO'. Below this is a menu with 'Work Orders' selected. The main content area is titled 'Work Order Report' and contains a table with the following data:

Work Order	Description	Asset Number	Asset Group	Status	Scheduled Start Date	Scheduled Completion Date	Attachments
<input type="checkbox"/> WO197547	Check all seals & refill oil as needed	FL2020	Fork Lifts	Complete	13-Oct-2005 11:29:29	13-Oct-2005 13:29:29	
<input checked="" type="checkbox"/> WO197543	Lubricate Fork Lift Mast	FL2020	Fork Lifts	Complete	13-Oct-2005 10:51:47	13-Oct-2005 11:51:47	
<input type="checkbox"/> WO112522	Right fork not operating	FL2020	Fork Lifts	Complete	03-Jun-2004 13:20:00	03-Jun-2004 15:20:00	

Below the table is a 'Select Parameters' section with various checkboxes for filters like 'Operations', 'Inventory Items', 'Resources', 'Direct Items', 'Work Requests', 'Meters', 'Short Text Attachments', 'Long Text Attachments', 'File Attachments', 'Asset BOM', 'Permits', 'Clearances', 'AventX Attachments/Safety Standards', and 'AventX Attachments/Burn Permit'. There are also dropdowns for 'Quality Plans', 'Template', 'Locale', and 'Format', along with 'Run' and 'Export' buttons.

The preview area shows the following details for WO197547:

- WO Type:** Reactive
- Priority:** Routine
- WO Number:** WO197547
- Description:** Check all seals & refill oil as needed
- Asset Number:** FL2020 **Area:** Warehouse
- Asset Description:** Fork Lift 2020 **Area Description:** Warehouse Building
- Department:** W-Maint **Work Request:**
- Depart. Description:** Warehouse Maintenance **Work Requestor:**
- WIP Account Class:** Start Date: 13-OCT-2005 11:29:29
- LOTO Required:** End Date: 13-OCT-2005 13:29:29
- LOTO Procedure:** Sched. Duration (Hrs): 2

Additional fields include 'Reconciliation Code: Total Actual Duration:', 'Completion Comments:' (with an empty text box), 'Follow-up WO Required: \_\_\_ Yes \_\_\_ No', and an 'Employee Time Tracking' table with columns for Date, Employee Name Printed, Operation, and Total Hours.

## Summary of Standard eAM Print Functionality in 11i and R12

The native process of work packet creation from eAM (both 11i and R12) is a burdensome workflow for maintenance planners. Planners must open each attachment in its native application and then print it. For example, a planner first prints the work order, then opens Microsoft Word to print the lockout/tagout procedure, then opens Microsoft Excel to print a safety checklist, and finally opens Microsoft Visio to print a parts diagram.

This process is not only inefficient, it introduces many opportunities for unintentional mistakes and oversights that undermine important protocols in a maintenance operation.

A scenario that often arises is for a document to be printed in volume and stored away so it can be quickly pulled when it's needed. Doing so, however, creates the risk of an outdated lockout/tagout or Material Safety Data Sheet making its way into the field.

Another common shortcut is to simply exclude critical documents altogether. When pressed for time, planners may choose to skip printing some attachments, leaving technicians without important information.

Finally, when printing work orders with many individual attachments, planners run the risk of one or more files not printing due to a printer or computer error. Or, someone else's print job may become interspersed among the planner's critical attachments. These common occurrences create confusion, and can result in attachments being excluded from the final work packet.

eAM's native attachment and print functionality results in:

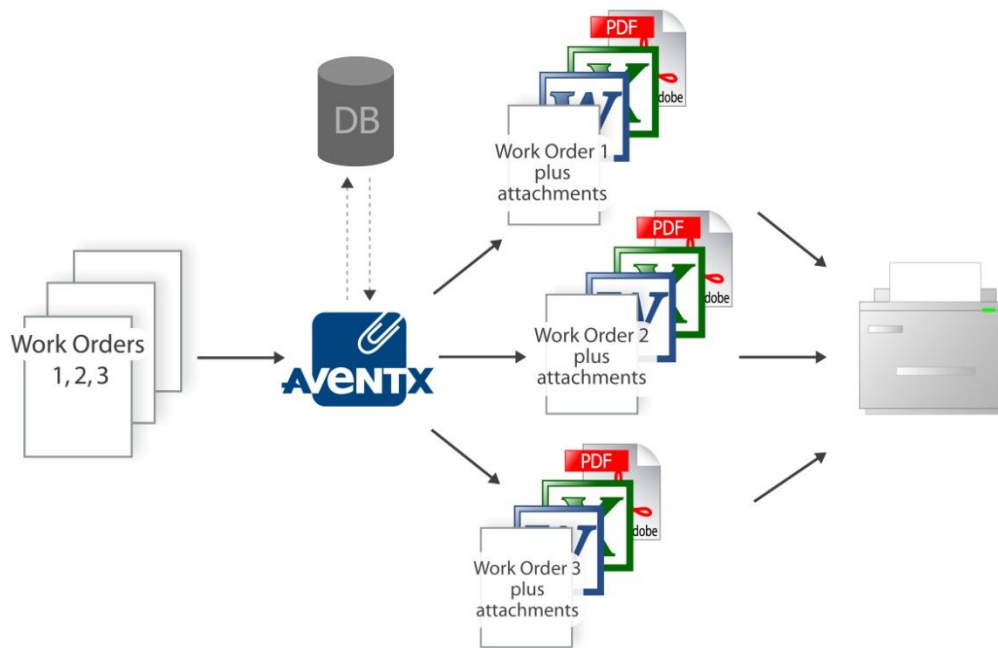
- **Reduced Productivity** for maintenance planners as a result of the manual, time-consuming printing and collating process
- **Broken Safety Protocols** due to incorrect file versioning or the exclusion of important documents caused by technology errors or human miscues; and
- **Decreased Asset Reliability** resulting from reduced wrench time caused by missing or incorrect safety documents and time lost going back to planners to obtain the correct documents

Oracle eAM's native process to produce work packets results in reduced productivity for maintenance planners that can be compounded due to manual errors, such as the assembly of incomplete or incorrect work packets. This can, in turn, be detrimental to the department's safety and reliability goals. If a work packet is missing an attachment, crew members must wait for the packet to be reprinted and reassembled before completing the work, limiting wrench time and impeding administrator productivity. This manual process includes unnecessary risks and generates major disruptions, even when processing as few as ten work orders per day. Ultimately, it erodes time and resource availability, and can result in higher operating costs.

### Automating Work Order Printing with Attachments

To remedy these common printing challenges, maintenance teams need a software solution to print and collate work orders and any accompanying attachments with one request from within Oracle eAM. Ideally this would be accomplished by submitting a standard print request to the Concurrent Manager, Oracle's report generator module (Fig. 5).

Figure 5: Automated Work Order and Attachment Printing Solution diagram





As shown in the diagram, the proposed solution submits a single or batch of work orders as a concurrent print request. Then, a third-party application, such as AventX Attachment Xpress, processes each work order with its associated attachments and directs the complete packet to the designated printer. Because attachments exist in virtually any format, it is important that any third-party application be capable of converting the attachments from their native formats into a “printable” format. For example, AventX supports the following “native” formats for attachments:

- Microsoft Office (2007, 2010, 2013, and 2016)  
Word, Excel, PowerPoint, Visio
- 2-Dimensional CAD (DWG)
- Image Files (TIFF, JPEG, GIF, PNG, and more)
- HTML
- TEXT and RTF
- PCL
- PDF

The following example uses AventX Attachment Xpress (hereafter referred to as AventX) as the third-party software solution for printing work orders and attachments in an Oracle EBS R12 environment using Self-Service. ***Please note that AventX’s advanced print functionality is available in Oracle EBS 11i and R12 environments and can be accessed via Oracle Forms or Self Service.***

### **AventX Advanced Work Packet Printing Submission**

Users can utilize AventX to print work orders and accompanying attachments by taking advantage of Forms personalization to add a “Submit Work Order(s) for Print” button that, when clicked, will allow the user to quickly submit a single work order or a range of work orders to AventX using a concurrent request.

When the request is submitted, AventX automatically pulls the attachments associated with the work order, translates them to a “printable” format, and forwards the work order with its attachments to the selected printer. With AventX, printing work orders with attachments is a simple, intuitive process (**Fig. 6**):

#### **User starts the process:**

- 1) User selects a work order or batch of work orders.
- 2) User selects which attachments to include with work order(s).
- 3) User selects the printer destination.

- 4) User chooses “Submit Work Order(s) for Print” and kicks off the print request.

**AventX does the rest:**

- 5) AventX processes the request in the background and submits the collated output to the printer.

Figure 6: Self Service with AventX print capabilities enabled

The screenshot shows the Oracle Asset Management interface for a Work Order Report. The report table contains the following data:

Work Order	Description	Asset Number	Asset Group	Status	Scheduled Start Date	Scheduled Completion Date	Attachments
<input checked="" type="checkbox"/> WO197547	Check all seals & refill oil as needed	FL2020	Fork Lifts	Complete	13-Oct-2005 11:29:29	13-Oct-2005 13:29:29	
<input type="checkbox"/> WO112522	Right fork not operating	FL2020	Fork Lifts	Complete	03-Jun-2004 13:20:00	03-Jun-2004 15:20:00	
<input type="checkbox"/> WO197543	Lubricate Fork Lift Mast	FL2020	Fork Lifts	Complete	13-Oct-2005 10:51:47	13-Oct-2005 11:51:47	

Annotations on the screenshot indicate the following steps:

1. Select work orders, single or multiple for
2. Select Attachments
3. Select a Printer
4. When finished, “Submit Work Order for Print”

## Final Output

Once the work order(s), plus the attachment(s), have been submitted to the specified printer, the final output prints in a collated fashion with formatting intact. Unlike native eAM functionality, all attachment file types are printed without loss of formatting (Fig. 7).

Figure 7: Complete work packet printed as a single document with all selected attachments included.

The figure shows a collage of documents that would be included in a printed work packet. The documents are layered and partially overlapping, showing the following content:

- Error Page:** A page with a header "ERROR PAGE" and a detailed error log including fields like Date/Time, Instance, Job ID, The key, Value 1, Value 2, Value 3, The error, ERR\_UNAB, and Exception.
- Manual:** A document titled "Oper Maintenance Manual" for "6060, 6060 Hydraulic". It includes a photo of a yellow forklift and text such as "Updated 4/4/2014", "Workplace", "Your safety is the workplace...", "Employees", "Meters", "Quality Plans", "Safety rules", and "Work Order #WO197547".
- Maintenance Work Order Form:** A form titled "Maintenance Work Order" with the following details:
  - WO Type: Reactive
  - Priority: Routine
  - WO Number: WO197547
  - Description: Check all seals & refill oil as needed
  - Asset Number: FL2020
  - Asset Description: Fork Lift 2020
  - Department: W-Maint
  - Area: Warehouse Building
  - Depart. Description: Warehouse Maintenance
  - WIP Account Class: 11:29:29
  - Work Requestor: [Blank]
  - Start Date: 13-OCT-2005
  - End Date: 13-OCT-2005
  - LOTO Required: 13:29:29
  - LOTO Procedure: [Blank]
  - Sched. Duration (Hrs): 2
  - Reconciliation Code: [Blank]
  - Total Actual Duration: [Blank]
  - Completion Comments: [Blank box]
  - Follow-up WO Required: \_\_\_ Yes \_\_\_ No
  - Employee Time Tracking table with columns: Date, Employee Name Printed, Operation, Total Hours.
  - Work Completed By: (print name) and Signature fields.
  - Reviewing Supervisor: (print name) and Signature fields.
- Other Documents:** A document with a header "BI015764-00 (EN-US)" and "OMM 6060, 6060FS(3 847 013.02)-EN 10/2014", and another with "Page 3 of 3".

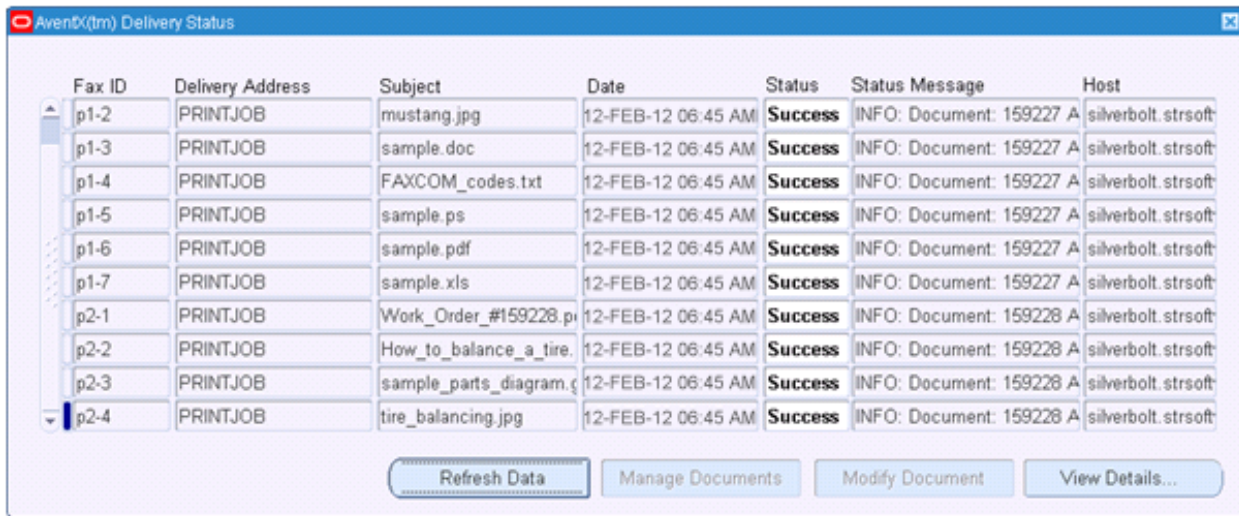
### Work Packet Sample:

- Work Order
- Supporting Attachments
  - Text Documents, Image Files, Excel, etc.
  - Manuals, Parts List, Safety Docs, etc.
- Error Page

## Status of Printed Documents

After generating a concurrent request, the user may then check the status of the printed documents by searching for the request ID using the AventX Delivery Status form (Fig. 8). The status of each work order document and its accompanying attachments are displayed here.

Figure 8: Work packet print status includes status of attachments



Fax ID	Delivery Address	Subject	Date	Status	Status Message	Host
p1-2	PRINTJOB	mustang.jpg	12-FEB-12 06:45 AM	Success	INFO: Document: 159227 A	silverbolt.strsoft
p1-3	PRINTJOB	sample.doc	12-FEB-12 06:45 AM	Success	INFO: Document: 159227 A	silverbolt.strsoft
p1-4	PRINTJOB	FAXCOM_codes.txt	12-FEB-12 06:45 AM	Success	INFO: Document: 159227 A	silverbolt.strsoft
p1-5	PRINTJOB	sample.ps	12-FEB-12 06:45 AM	Success	INFO: Document: 159227 A	silverbolt.strsoft
p1-6	PRINTJOB	sample.pdf	12-FEB-12 06:45 AM	Success	INFO: Document: 159227 A	silverbolt.strsoft
p1-7	PRINTJOB	sample.xls	12-FEB-12 06:45 AM	Success	INFO: Document: 159227 A	silverbolt.strsoft
p2-1	PRINTJOB	Work_Order_#159228.p	12-FEB-12 06:45 AM	Success	INFO: Document: 159228 A	silverbolt.strsoft
p2-2	PRINTJOB	How_to_balance_a_tire.	12-FEB-12 06:45 AM	Success	INFO: Document: 159228 A	silverbolt.strsoft
p2-3	PRINTJOB	sample_parts_diagram.g	12-FEB-12 06:45 AM	Success	INFO: Document: 159228 A	silverbolt.strsoft
p2-4	PRINTJOB	tire_balancing.jpg	12-FEB-12 06:45 AM	Success	INFO: Document: 159228 A	silverbolt.strsoft

Refresh Data    Manage Documents    Modify Document    View Details...

## Value of Automated Work Order Attachment Printing

The inability to automatically print work orders and accompanying attachments from eAM is a challenge for users to manage and a risk concern for management. The mistake-prone process of compiling work packets using solely native functionality, puts safety and reliability standards at risk. The native process is detrimental to the maintenance team's preventative maintenance and wrench time initiatives.

By combining Oracle's eAM asset management tool with STR Software's AventX Attachment Xpress, you can eliminate this time-consuming, mistake-prone, manual process for maintenance planners, while enabling them to spend more time working towards achieving their preventative maintenance goals.

## Summary

When considering how crucial asset reliability and uptime are to the overall success of your organization (revenue and profit), eliminating as much risk as possible is a primary corporate goal. Upon investigation, you will find that native Oracle eAM print functionality opens your organization up to not only a loss of productivity, but also unnecessary risk. This assumed risk limits your maintenance department's ability to safely and successfully achieve its preventative maintenance goals.

### Oracle eAM + AventX

- **Increased Productivity** for maintenance planners by eliminating the manual, time-consuming printing and collating process
- **Improved Safety Standards** by ensuring each work packet prints with critical, up-to-date safety documents, parts lists, and other associated attachments
- **Better Asset Reliability** as a result of increased wrench time due to a reduction in work order errors and more time for planners to focus on preventative maintenance

As outlined herein, eAM allows you to attach documents to a work order, but it does not provide the necessary technology for you to print a work order and accompanying attachments in one print request. This gap results in lower maintenance planner productivity that, in turn, leads to safety and asset reliability shortcomings, which do not help advance preventative maintenance and increased wrench time initiatives.

By pairing eAM with a solution like AventX Attachment Xpress, your organization will enjoy substantial improvements in productivity, safety, and asset reliability.



## What to Look for in a Vendor

When considering a document printing solution, try to obtain the following information from each vendor:

- Live demo of the vendor's product within Oracle eAM (11i or R12)
- Installed customer references
- Annual support agreement – what is included?
- Support – is it provided by the vendor or an outsourced company?
- Customizations – does the vendor document product customizations and support them?
- Implementation – ask for a detailed outline and list of tasks and resources required to implement the solution

## STR Software Information and Product Demonstrations

To learn more about how the AventX product suite can help you achieve your maintenance safety, utilization, and reliability goals, please contact STR Software at (804) 897-1600 opt. 2 (toll free at (800) 897-7097) or [info@strsoftware.com](mailto:info@strsoftware.com).

Explore additional resources available on the topic of automated work packet printing: <http://www.strsoftware.com/eam>

## About STR Software

Founded in 1986, STR Software is headquartered in Richmond, Virginia. Providing a single point of contact for its AventX and DataVaya product suites, the company develops, markets, and supports automated document delivery solutions for email, fax, internet fax, and print as well as automated data file transfer solutions to enable sophisticated hybrid cloud, IoT, and ERP data transactions. These solutions integrate with host ERP applications, such as JD Edwards, Oracle E-Business Suite, PeopleSoft, and SAP; in Unix, Linux, MPE, and Windows environments. STR Software, an Oracle PartnerNetwork Gold Partner, has been recognized for engineering reliable “Solutions That Run.”

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