



Design/Development

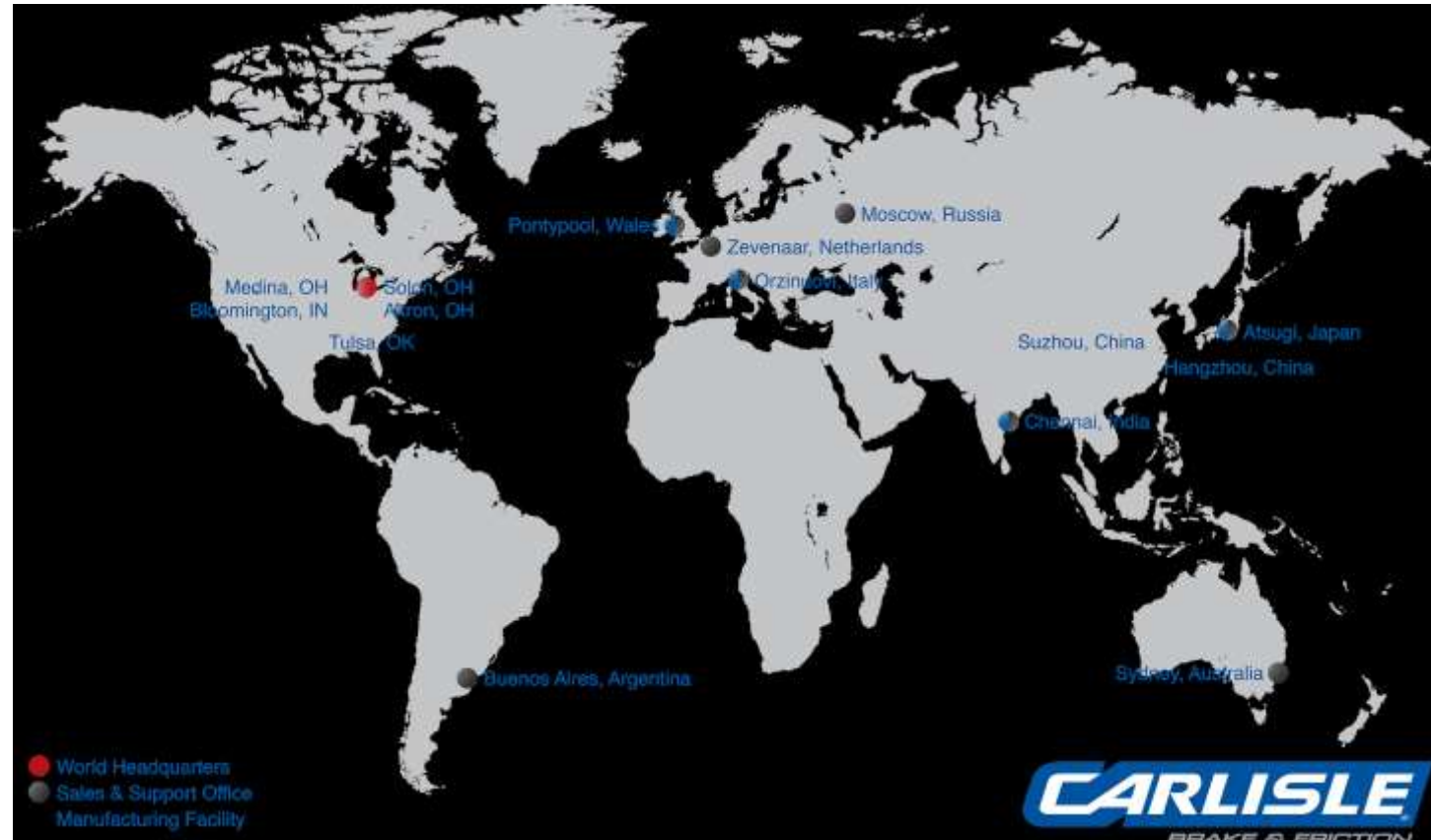
Test Request System in Aras

Carlisle Brake & Friction (CBF) Overview



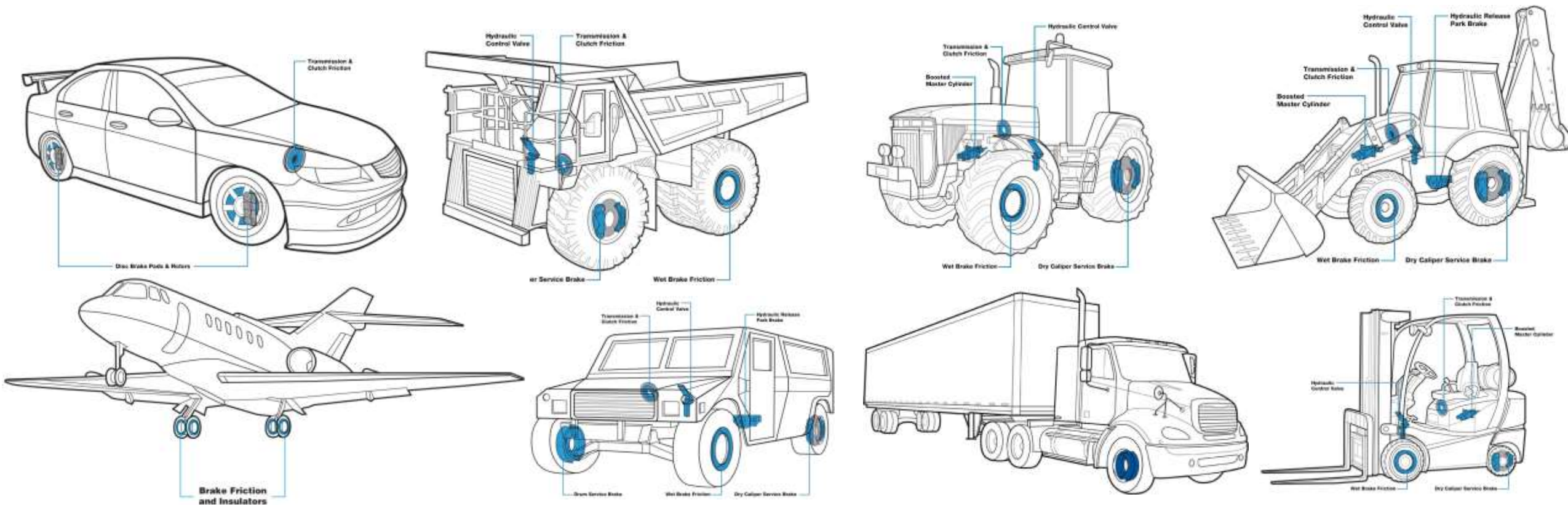
11 manufacturing facilities globally:

- U.S.
- U.K.
- Italy
- China
- Japan
- Serving 100 leading OEM's in 50 countries



CBF Markets

- Provider of high performance and severe duty brake, clutch and transmission applications to OEM and aftermarket customers: Mining, Construction, Military, Agricultural, Motorsports, Industrial, Aerospace



Challenges/Complexity Faced

- Provide global visibility between all business units
- Migrate and link existing systems
- Maintain flexibility in material development and system design
- Leverage standard reporting/dashboards
- Comply with ITAR/EAR regulations
- Maintain global data security
- Provide standard work instructions/training for end users



Issues Driving Implementation

1. Need to unify data in multiple systems across the organization
2. Streamline ISO/TS Certification Audits
3. Provide a platform for R&D Test Management globally
4. Reduce time from customer request to solution
5. Conform new acquisitions to standardized processes and data management



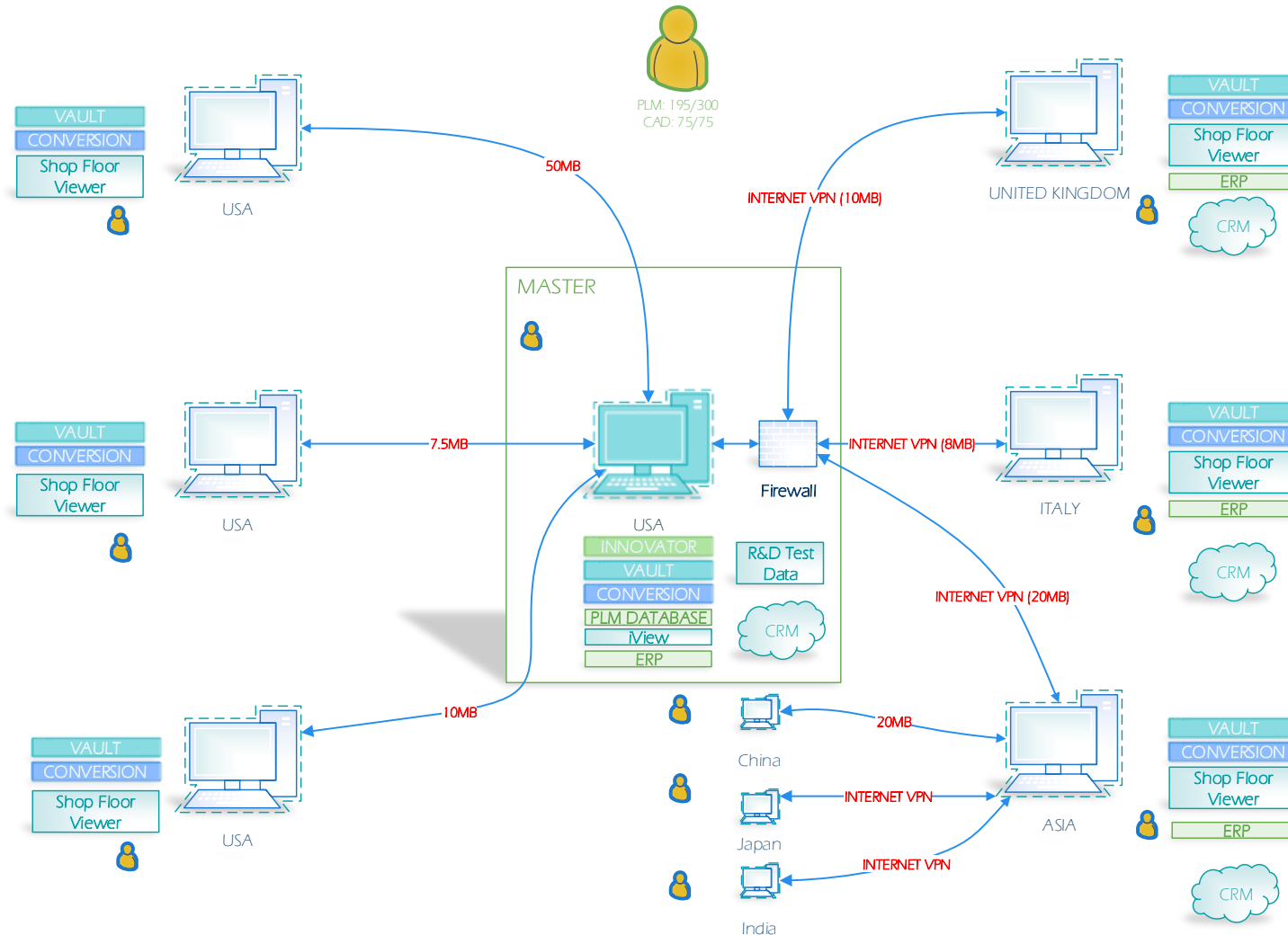
Solution via Aras Innovator

1. Issue: Need to unify data in multiple systems across the organization
Solution: Migrate/federate existing systems providing a single source of truth
2. Issue: Streamline ISO/TS Certification Audits
Solution: Utilize standard dashboards/reporting tools
3. Issue: Provide a platform for R&D Test Management globally
Solution: Use Aras Innovator as a central repository for all data
4. Issue: Reduce time from customer request to solution
Solution: Standard workflow to drive efficiency
5. Issue: Conform new acquisitions to standardized processes and data management
Solution: Enforce defined standards for new acquisitions

1. Unification of Data



Global System Architecture



• Systems

• Cloud

- CRM – Microsoft Dynamics

• Corporate Intranet

- PLM – Aras
- ERP – QAD
 - Work Order Routers

• CAD Data

- PTC Creo 3 / ITI-Aras

• R&D Test Management

- Test Equipment
- Preventative Maintenance
- Test Requests
- Design/Development

2. Standardize Dashboards/Reports

- Combine data from CRM, ERP & PLM
 - Custom .NET Class Libraries for Aras Innovator to consume via Federation
 - CRM
 - ERP
 - PLM
 - CAD
 - Migrated PTC Windchill and File data into Aras Innovator
 - R&D Test Data
 - Moving from existing in-house MSSQL database system to Aras Innovator



2. Standardize Dashboards/Reports...

- Custom .NET Applications for data retrieval
 - Visual Studio Professional 2012/2015
 - C#.NET, ASP.NET, MVC, Aspose.NET Total, ODBC, Microsoft Dynamics CRM SDK, Web Services...
 - SVN repository used to version control all custom code



2. Standardize Dashboards/Reports...



- Custom .NET Applications for data retrieval
 - Class Libraries – Consumed by Aras Innovator & other custom applications
 - CRM
 - Persist CRM organization service connection in parent application
 - Use CRM SDK query expressions and entity collections to pull communicate with CRM
 - Results returned as needed in multiple formats
 - ERP-QAD
 - Progress ODBC drivers installed on development machine and IIS server
 - TSQL queries sent via ODBC to ERP
 - Results returned as needed in multiple formats

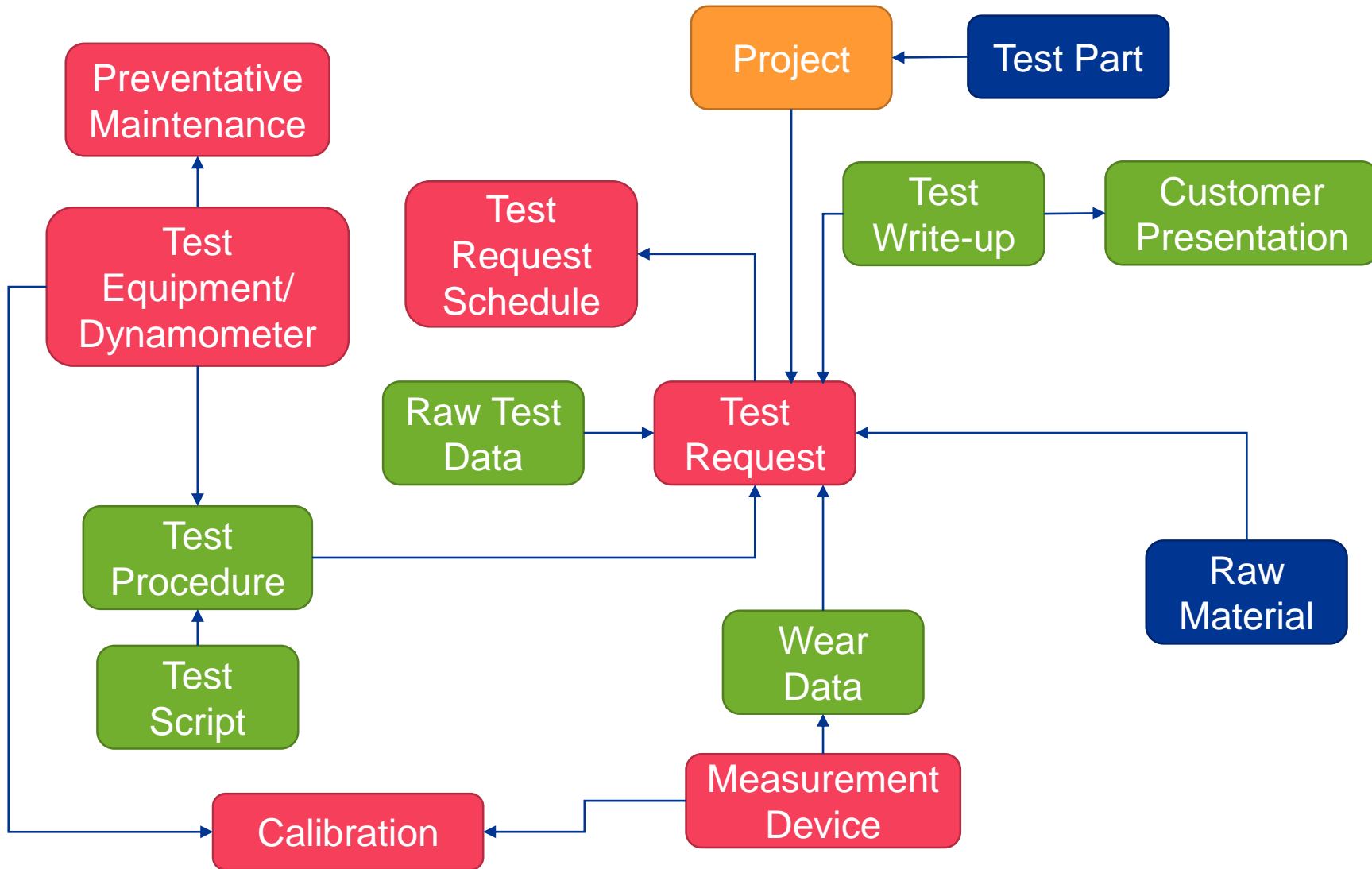


2. Standardize Dashboards/Reports...

- Custom .NET Applications for data retrieval
 - Shop Floor Router & Print Viewer (read only)
 - Web based ASP & MVC applications, ERP and IOM libraries used
 - Login with Aras Innovator credentials for security
 - Query ERP for routers and Aras Innovator for released CAD data by manufacturing site
 - Generate PDF output as download, PDF is watermarked for 24 hour use and for ITAR/EAR compliance



3. R&D Test Management



- Aras Innovator Part
- Aras Innovator Document
- Aras Innovator Project
- Aras Innovator Custom Item

3. R&D Test Management ...

- Custom Item Types
 - Test Request
 - A request to run a Test Procedure on a Material/Part using Test Equipment
 - Test Equipment/Dynamometer
 - Testing machinery used to perform tests on Materials/Parts
 - Test Request Schedule
 - Calendar based scheduling of Test Requests by Test Equipment



3. R&D Test Management ...



- Custom Item Types...
 - Preventative Maintenance (PM)
 - Periodic maintenance scheduling and logging system for Test Equipment, could be used for other machinery as well.
 - Standardized templates and procedures
 - Calibration can be a scheduled PM item
 - Measurement Device
 - Tooling used to record all measurements during testing
 - Calibration
 - Logging system for Measurement Devices
 - Standardized templates and procedures

3. R&D Test Management ...

- Custom Aras Innovator Documents
 - Test Procedure
 - Defines setup, testing, wear data recording, raw data recording and teardown.
 - Test Script
 - Implements Test Procedure on Test Equipment
 - CBF Dynamometer Script, Link Dynamometer Script
 - Wear Data
 - Formal record of wear data
 - Raw Test Data
 - Test data generated by CBF/Link Dynamometers and other Test Equipment
 - Test Write-up
 - Consolidated report of all test related data upon test completion
 - Customer Presentation
 - Customer version of Test Write-up per application



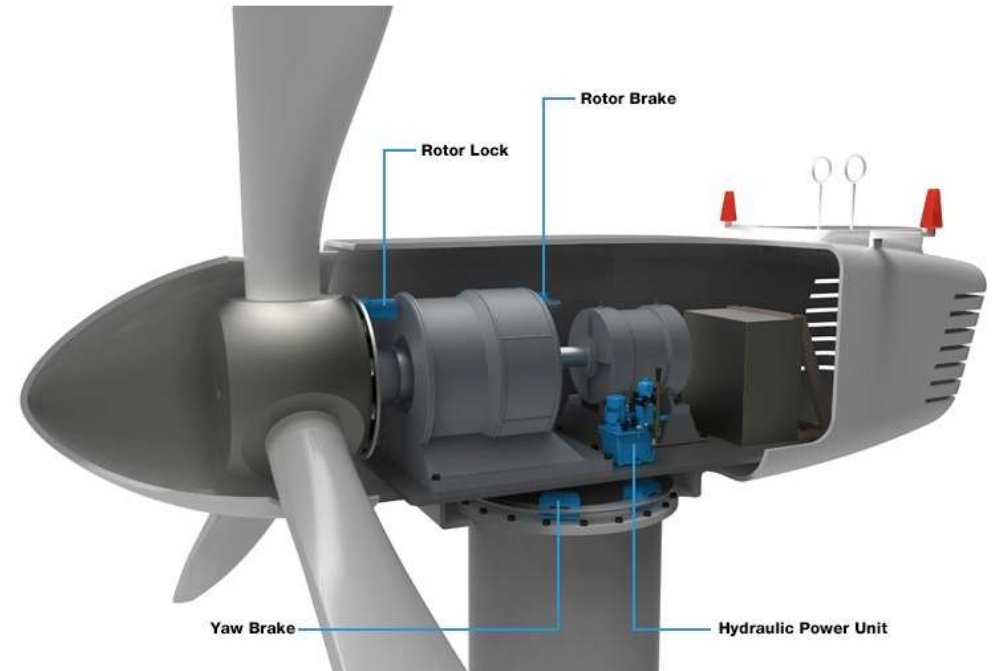
4. Drive Efficiency with Workflow

- Project Management Workflows
 - Utilize project templates and teams
 - Track time on projects to maintain balanced workload
 - Real-time feedback on project gate status
- R&D Test Workflows
 - Test Request
 - Improve global testing collaboration
 - Test Procedure
 - Integrate dynamometer run-time Test Scripts with Test Procedures Workflows



5. Enforce Defined Standards

- Shared Global Resources
 - Test Request Scheduling
 - Maintain balanced use of test equipment globally
 - Test Procedures
 - Versioned procedures with approval process
 - Versioned test scripts with approval process
 - Test Equipment/Dynamometers
 - Preventative Maintenance Logs
 - Calibration Logs
 - Test Output (Versioned Document Templates)
 - Wear Data
 - Test Write-up
 - Customer Presentations
 - Raw Data
 - Web based Shop Floor Router and Print Viewer
 - ITAR/EAR compliance enforced via Innovator user accounts, active directory and IP address
 - Generated documents are watermarked with 24 hour use and ITAR/EAR compliance data



Progress/In Process

- Define global system architecture
- Train users
- Configure Change Management & Product Engineering
- Migrate CAD & product data
- Integrate Microsoft Dynamics CRM
- Provide manufacturing floor with real-time data
- Configure Project Management: NPD/NPI
- Design Test Request System



Future Vision

- Move to Aras Innovator 11
- Incorporate Quality and Manufacturing Systems
- Utilize Part BOM and CAD Document float on release
- Classification-based search grids
- Move custom code SVN repository in Aras Innovator
- Enhance Innovator, CRM and ERP automation
 - Generate PLM Projects in Aras Innovator from CRM workflow
 - Push PLM EBOM from Aras Innovator into ERP on release of Process ECN
- Test Management Automation
 - Template based graphical drag-drop customer report generator
 - Test Requests, Projects, Custom raw data filtering and error checking
 - Barcoding test parts and test requests to integrate test equipment and PLM
 - Wireless measurement equipment for test wear data
 - Incorporate camera based measurement system for wear data

Questions?

