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## Inventory

The main database spreadsheet is similar to Microsoft Excel. It has "in-cell" drop down lists, multiple scrolling splits. Risk Level is displayed in a colour coded high, medium and Low cell.

Identifier	RBI	Serial	Description	From	To	Site	System	Material Specification
36*WT-2311-186a-ku	Low	2311	LVR FEED/ND1 CTU	CRUDE UNITS 1 &	P101 & LINE	PJ1	PSR1	36*186a
PA-0392	High	0392	VC5601B AIR COOLER	CRUDE UNITS 1 &	LINE FO 7701	PA	PSR1	08*1C3a
02*ML-0013-786a-lpa	Low	0012	HP PRODUCT COOLER	CRUDE UNITS 1 &	P101 & LINE	PJ1	PSR2	02*786a
PA-TANK-9999	Low	9999	WATER WASH TOWER	HEADER CTU 182	LINE FO 7701	PA	PSR2	36*186a
06*WT-9374-683a-ku	Low	9374	METHANOL EXPORT LINE TSV	HEADER CTU 182	P101 & LINE	RC	PSR3	00*06*682
06*WT-2425-683a-lpa	Low	2425	METHANOL EXPORT LINE TSV	HEADER CTU 182	P101 & LINE	RC	PSR7	00*06*682
06*WT-9379-683a-ku	Low	9378	METHANOL EXPORT LINE TSV	HEADER CTU 182	P101 & LINE	RC	PSR3	00*06*682
06*WT-5563-683a-ku	Low	5563	METHANOL EXPORT LINE TSV	ABC	XYZ	RC	PSR3	00*06*682
06*CR-3433-683a-let	Low	3433	LVR FEED/ND1 CTU	ABC	XYZ	PA	UNIT 2	00*06*682
PA-TANK-0021	Low	0021	LVR FEED/ND1 CTU	XYZ	XYZ	PA	UNIT 4	02*786a
02*SI-0213-786a-let	Low	0213	HP Steam	CRUDE UNITS 1 &	LLH/0012	PA	PSR1	02*786a
06*SI-0144-683a-lpa	Low	0144	HP Steam	CRUDE UNITS 1 &	LLH/0012	PA	PSR1	00*06*682
08*WT-5433-1C3a-lpa	Low	5433	VC5601B AIR COOLER (Vessel)	LLH/0111	LLH/0012	PA	PSR1	08*1C3a
FJH-0393	Low	0393	LVR FEED/ND1 CTU	LLH/0111	LLH/0012	PJ1	AA4	08*1C3a
06*CR-0393-683a-let	Low	0393	LVR FEED/ND1 CTU	LLH/0111	LLH/0012	PA	PSR1	00*06*682
01*CR-0393-186a-let	Low	0393	LVR FEED/ND1 CTU	LLH/0111	LLH/0012	PA	PSR1	01*186a
PA-TANK-0242	Low	0242	METHANOL MAIN	CRUDE UNITS 1 &	P101 & LINE	PA	PSR1	36*186a
PA-TANK-8943	Low	8943	METHANOL MAIN	CRUDE UNITS 1 &	P101 & LINE	PA	PSR1	36*186a
36*ML-0932-186a-let	Low	0932	METHANOL MAIN	CRUDE UNITS 1 &	P101 & LINE	PA	PSR1	36*186a
02*CR-9432-786a-let	Low	9432	LVR FEED/ND1 CTU	LLH/0111	LLH/0012	PA	PSR1	02*786a
PA-8973	Low	8973	LVR FEED/ND1 CTU	LLH/0111	LLH/0012	PA	PSR1	02*786a
02*CR-7463-786a-let	Low	7463	LVR FEED/ND1 CTU	LLH/0111	LLH/0012	PA	PSR1	02*786a
02*CR-8473-786a-let	Low	8473	LVR FEED/ND1 CTU	LLH/0111	LLH/0012	PA	PSR1	02*786a
02*CR-8743-786a-let	Low	8743	LVR FEED/ND1 CTU	LLH/0111	LLH/0012	PA	PSR1	02*786a
PA-TANK-4535	Low	4535	LVR FEED/ND1 CTU	LLH/0111	LLH/0012	PA	PSR1	00*06*682
06*CR-3424-683a-let	Low	3424	LVR FEED/ND1 CTU	LLH/0111	LLH/0012	PA	PSR1	00*06*682
PA-6643	Low	6643	LVR FEED/ND1 CTU	LLH/0111	LLH/0012	PA	PSR1	00*06*682
06*CR-7679-683a-let	Low	7678	LVR FEED/ND1 CTU	LLH/0111	LLH/0012	PA	PSR1	00*06*682
06*CR-4545-683a-let	Low	4545	LVR FEED/ND1 CTU	LLH/0111	LLH/0012	PA	PSR1	00*06*682
06*CR-9999-683a-let	Low	9999	LVR FEED/ND1 CTU	LLH/0111	LLH/0012	PA	PSR1	00*06*682

## Rapid Searching

Finding records is made simple with the spreadsheet search and filter. Select any criteria such as serial, Drawing, P&ID or material.

Find or Filter

Search Criteria

Find Where: Serial

Options

Search for Exact Match

Find in Group

Filter From Group

Contains: 3234

Cancel Find

## Inventory Record Form

Individual Asset records can be viewed and edited using a Windows standard "Tab" type form that presents data in logical pages.

Extended Data

Comment General Access Insulation

Pressure Temperature Design Life Tables Misc.

Operating: 104 PWHT: 0

Design: 100

Maximum: 750

Cyclic

## Inventory Data Sheets.

Special data relating to complex assets is stored on Data Sheets forms. These forms are very comprehensive and include a preview and print facility.

## Available Data Sheets include

- Columns

- Heat Exchangers
- Furnaces
- Vessels
- Fin Fans

Furnace Data Sheet

Item: 3401 T-A234 WPG-9 Description: FRESH FEED HEATER

Manufacturer: K.T.I. Type: CAN

Date of Manufacture: Jan 31 1984 Purchase Order #: 84001

Purchase Order #: 84001 Requestion #: 84001

General Assembly Drgs: 84001/1827/1401.D002 Service:

Tube Data

	Radiant Outlet	Radiant Inlet	Convection	Conv. Steam Coil	Mar
Tube Material	9Cr 1Mo	9Cr 1Mo	9Cr 1Mo		JOHN ZINC
Tube O.D.					LNv-PC-50
Tube Wall Thickness					No. of Burners
Corrosion Allowance					Local
Arrang.Hor / Vert	VERT	VERT	HORIZ		FLOOR
No. of Parallel Coils					Design Cg
No. of Tubes Per Coil					

## Item Groups

Users can create any number of Groups based upon a simple user-defined criteria. The Groups are stored for re-use.

Select Item Group

Public Private Special Level

- Commission Date Before 1975
- Dia 6 press > 550 and tempdesign = 100
- LP Steam Lines
- Methanol Sub System
- Module = m2 and designlife = 5
- Press > 500 and Dia = 02"
- Pumps Due for Inspection
- Risk Level Medium
- System RBI Rating

Find Next: Pumps

Select Cancel

## Attached Data

Each record in the asset database can have several attached lists of data such as CAD drawings, Word Documents and Picture files.

Attached: Documents

Code	Description	File
1	Heat Ex 1	Unit 4A PIPE_D.BMP
2	Heat Exchanger	Flange face damage 00000037.BMP
3	RAD	Scanned Radiographic ime RAD_256.BMP

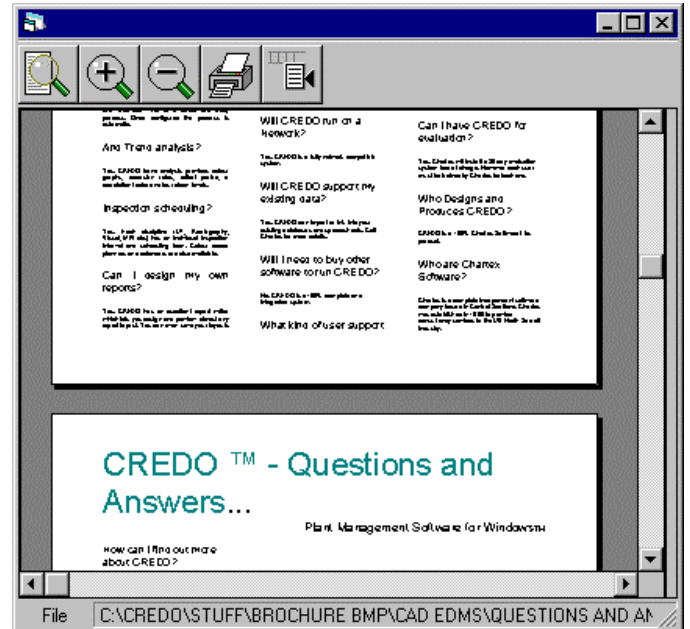
**Pictures**

Credo contains a flexible Document Library where any number of scanned or digitised images may be stored and organised. Credo supports all the standard formats. Pictures can be taken from a digital camera, scanner



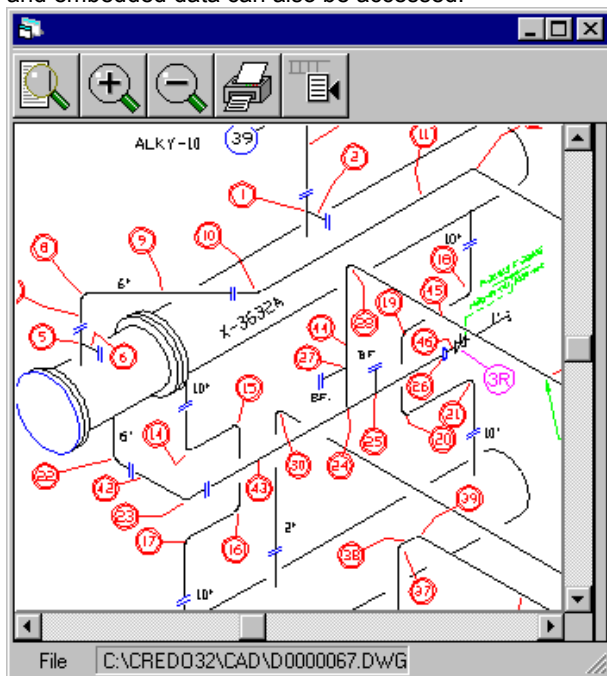
**Document Management**

The sophisticated Electronic Document Management System (EMDS) built into Credo handle over 200 different file formats such as Word™, Excel™, dBase™ and most other popular PC systems.



**CAD**

The CAD system is built into Credo and supports all revisions of AutoCAD™, DXF and, optionally, Inter-Graph. Images can be zoomed, copied, printed, redlined. Layers and embedded data can also be accessed.

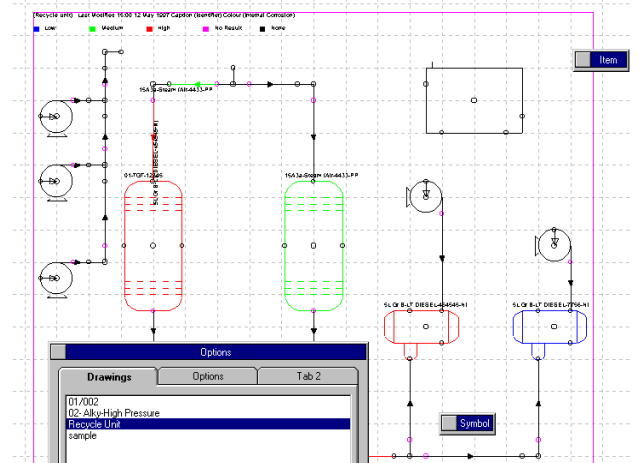


**Attached CAD Files**

Attaching native AutoCAD or MicroStation CAD files to Asset records simplifies location and viewing. Credo also contains a powerful CAD library with search and filter tools.

**Process Diagrams**

The unique and powerful Process Diagram Builder allows sophisticated 2D diagrams to be constructed from a standard symbol list. Each part of the resulting diagram can then be linked to the underlying Credo Database for automatic risk based colour coding and annotating.



**Inspection Scheduling**

All inspection activities are managed by central scheduling spreadsheet form, shown below.

WorkPack	Options	Status	Inspection Type	Inspection Date	Start Date	Complete
W-1441-DP	01"-CR-0393-1B6s-let	In Progress	Dye Penetrant	Nov 29 1993	Nov 29 1993	Nov 29
W-1423-DP	01"-CR-0393-1B6s-let	In Progress	Dye Penetrant	Nov 29 1995	Nov 29 1995	Nov 29
W-1231-EV	01"-CR-0393-1B6s-let	Pending	External Visual	Nov 28 1998	Nov 28 1998	Nov 28
W-1531-UT	01"-CR-0393-1B6s-let	In Progress	General UT	Nov 30 1991	Nov 30 1991	Nov 30
W-1981-HD	01"-CR-0393-1B6s-let	Pending	Hardness	Nov 28 1998	Nov 28 1998	Nov 28
W-1231-RAD	01"-CR-0393-1B6s-let	Pending	Radiography	Nov 28 1998	Nov 28 1998	Nov 28
W-1981-UT	01"-CR-0393-1B6s-let	In Progress	UT Wall Thickness	Feb 29 1976	Feb 29 1976	Feb 29
W-4564-UT	01"-CR-0393-1B6s-let	In Progress	UT Wall Thickness	Jan 01 1982	Jan 01 1982	Jan 01
W-2381-UT	01"-CR-0393-1B6s-let	In Progress	UT Wall Thickness	May 30 1995	May 30 1995	May 30
W-2378-UT	01"-CR-0393-1B6s-let	Pending	UT Wall Thickness	Mar 23 1998	Mar 01 1996	Mar 23
W-3451-HD	01"-CR-0393-1B6s-let	Pending	UT Wall Thickness	Nov 28 1998	Nov 28 1998	Nov 28

The "Wall Planner" form, shown below provides an alternative view of the inspection schedule. This view sorts and colour codes each inspection into rows and columns providing a clear graphical overview.

Item	Discipline	Oct 05 1997	Oct 22 1997	Dec 30 1997	Jan 01 1998	Feb 28 1998	Mar 14 1998	Mar 20 1998	Mar 23 1998	Apr 01 1998	Oct 05 1998	Nov 28 1998	Jan 05 1999	Mar 01 1999
01"-CR-0393-1B6s-let	Radiography													Pend.
02"-CR-0432-7B6a-let	UT Wall Thickness													
02"-CR-0473-7B6a-let	UT Wall Thickness													
02"-ST-0213-7B6a-let	UT Wall Thickness													
06"-CR-0393-6B3a-let	UT Wall Thickness													
06"-CR-3333-6B3a-was	UT Wall Thickness				Prog									
06"-MT-5678-6B3a-lu	UT Wall Thickness													
06"-MT-9374-6B3a-lu	UT Wall Thickness													
06"-ST-0144-8B3a-lpa	UT Wall Thickness													
06"-WT-5433-1C3a-let	Dye Penetrant									Prog				
36"-ML-0932-1B6s-let	UT Wall Thickness													
36"-WT-2311-1B6s-lu	UT Wall Thickness			Comp				Prog						Pend.
36"-WT-2311-1B6s-lu	Visual External													
36"-WT-2311-1B6s-lu	General UT		Prog											
36"-WT-2311-1B6s-lu	Dye Penetrant													Pend.
36"-WT-2311-1B6s-lu	Radiography					Over								
PA-0392	UT Wall Thickness													Pend.

### General Inspections

Item	Status	Inspection Type	Comment	Requested By
D 0103--	Complete	MPI	Accepted - Area inspected 360° around neck.	
D 0104--	Complete	MPI	Accepted - Area Inspected 360° around neck. No defects located. Mechanical score marks noted.	
D 0125--	Complete	GENERAL UT.	See attached images.	
D 0571--	Complete	UT Wall Thickness	ATTENUATION CHECKS ON REACTOR SHELL PLATES.	
D 0571--	Complete	UT Wall Thickness	ATTENUATION SURVEY COMPLETED ON REACTOR HEADS.	

The full range of General Inspection disciplines are supported such as Visual, MPI, Dye Penetrant, Radiography etc.

### UT Data Collection

The UT system is particularly powerful and flexible featuring Short, Medium and Long term Trend Analysis. The Trending tool can be fine-tuned by the user to give optimum results. Results are displayed graphically or in a spreadsheet format.

### Inspection Points

Each Asset or Item can have any number of attached drawings and inspection points. Each point contains a survey history, corrosion rate and remaining life.

Location	Seq	Desc	Feature	Material	Drawing	Tag	Reading Proc Code	Corr Short mm/Yr	Confid Short %	Retiral Short
IS0 2	1	P.1	ST	24"-1B6s	CD-0012-034			5.52	100.0	Apr 1996
IS0 1	7	C4	ST	01"-1B6s	CD-0012-034 VIS		305.9/01	5.42	100.0	May 1996
IS0 4	3	P.3	T	02"-1A1F	M-0012-044			2.08	100.0	Dec 1994
IS0 2	4	P.4	ST	02"-7B6a	CD-0012-034			2.03	100.0	Aug 1997
IS0 2	2	P.2	ST	24"-1B6s	CD-0012-034			1.14	100.0	Jul 1998

### Survey Results

Survey data such as thickness-readings, colour coded Alarm Status and comments are presented in an easy to use spreadsheet. The presence of an Ascan is clearly indicated (circled below).

Item	Status	Date	Thickness	Alarm
5	Cancelled	Dec 25 1991	5.50	2
6	Complete	Nov 18 1994	3.40	2
7	In Progress	Dec 31 1995	2.86	2
8	Pending	Dec 30 1997	2.50	2
9	Pending	Dec 13 1999		

### Spreadsheet Data Entry

The UT survey spreadsheet provides a powerful colour coded overview of past and current readings. Typed values are immediately colour coded with reference to applied alarm values.

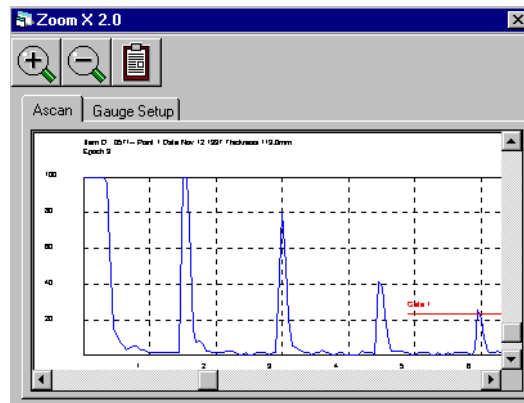
Prnt.	Mat.	Nom.	Apr 25 1991	Sep 10 1991	Oct 02 1992	Sep 15 1993	Nov 18 1994	Dec 31 1995	Dec 30 1997	Mar 20 1998	Mar 01 1999
X1	02"-7B6a	8.70	10.20	8.70	7.60	7.10	5.40	4.40	4.30		
A2	01"-1B6s	7.50	2.10	7.70	8.10	8.40	7.70	3.75	4.00		
A3	02"-7B6a	8.70	9.00	7.80	7.60	7.40	7.30	4.30	3.00		
C1	02"-7B6a	8.70	12.00	11.00	11.10	7.60	5.60	5.00	4.70	2.00	
C2	01"-1B6s	7.50	8.70	5.10	7.60	5.40	5.10	2.84	5.00	1.00	
C3	01"-1B6s	7.50	8.70	8.50	7.60	7.50	7.30	3.30	23.20	23.00	
C4	01"-1B6s	7.50		8.90	9.40	2.50	8.90	2.84		34.00	

For an instant colour coded report, simply press the print button, preview the result and send to the printer.

Prnt.	Mat.	Nom.	Apr 25 1991	Sep 10 1991	Oct 02 1992	Sep 15 1993
X1	02"-7B6a	8.70	10.20	8.70	7.60	7.10
A2	01"-1B6s	7.50	9.87	8.50	8.10	8.40
A3	02"-7B6a	8.70	9.00	7.80	7.60	7.40
C1	02"-7B6a	8.70	12.00	11.00	11.10	7.60
C2	01"-1B6s	7.50	8.70	8.40	8.20	8.10
C3	01"-1B6s	7.50	8.70	8.50	7.60	7.50
C4	01"-1B6s	7.50	9.00	8.90	7.80	7.60

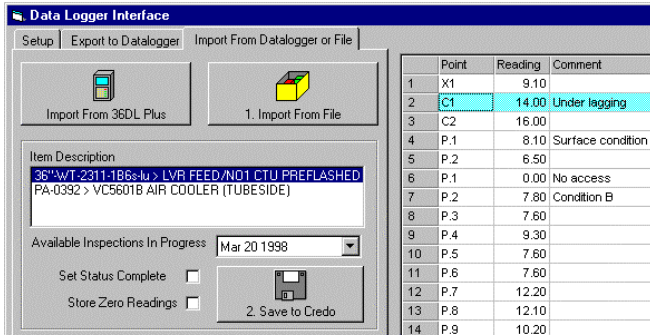
### Ascan

Each UT reading can also contain an Ascan image, captured from the data logger memory that can be viewed, printed and copied.



### Data Logging

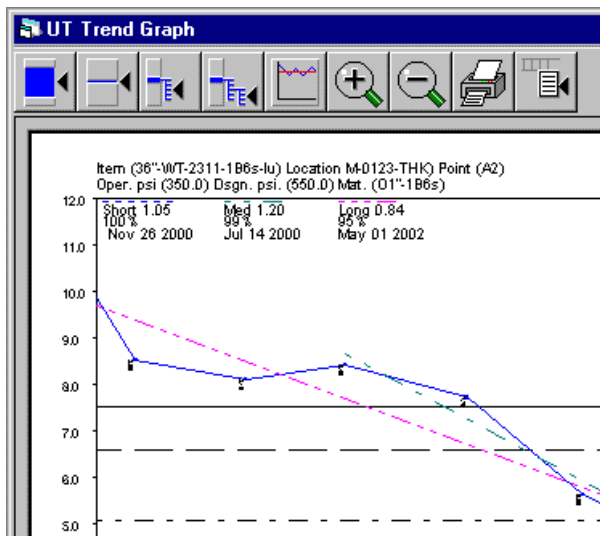
A full function Data Logger interface is built into Credo dispensing with the need for third party interface programs. Credo talks directly to Panametrics, Kraut-Kramer and Sonatest equipment.



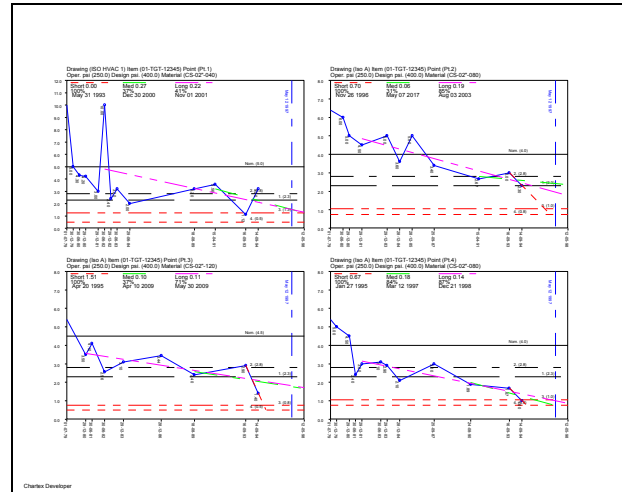
Importantly, Data Logger Workpacks can be attached to normal Emails allowing support for remote sites.

### Trend Graphs

The Credo Corrosion Trending system is particularly comprehensive featuring a Short, Medium and Long-Term analysis with retiral dates and correlation factors. Results are available in tabular or graphical form.



Any number of graphs can be placed on the page from 1 to 9 by 9. The preview page can be zoomed and copied to the Windows clipboard and then pasted into another document.



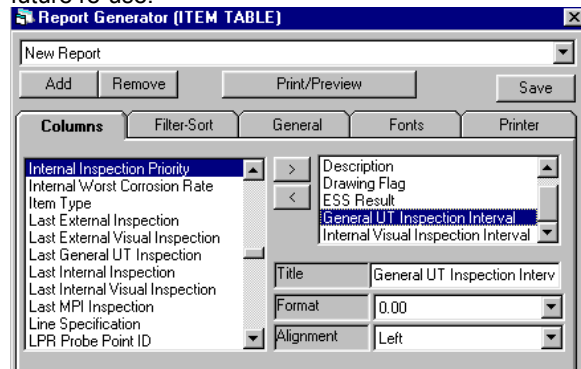
### Reports

Reports are available in summary or detailed format. Colour coding highlights key areas and simple filters focus attention on key data.

Pnt	Mat	Nom	Corr S	Life S	Corr M	Life M	Corr L	Life L	Sep 15 93
X1	02*-7B6 a	8.70	0.05	77.0	0.62	5.2	0.88	3.1	7.10
A2	0*-1B6s	7.60	0.26	16.6	0.82	4.5	0.66	6.0	8.40
A3	02*-7B6 a	8.70	0.65	3.7	1.14	1.9	0.83	3.3	7.40
C1	02*-7B6 a	8.70	0.15	28.2	0.62	5.9	1.22	2.1	7.60
C2	0*-1B6s	7.60			0.16	20.3	0.51	5.1	5.40
C3	0*-1B6s	7.60	0.45	10.2	0.47	0.9	0.44	10.6	7.60
C4	0*-1B6s	7.60	5.42	None	1.15	0.5	1.14	0.5	2.60
Location ISO 2									
P.1	24*-1B6s	7.60	4.74	None	1.69	None	1.69	None	
P.2	24*-1B6s	7.60	0.02	100.0	0.10	58.8	0.46	9.9	6.90
P.3	02*-7B6 a	8.70	0.04	100.0	0.70	4.8	0.70	4.8	6.00
P.4	02*-7B6 a	8.70	2.03	None	1.17	1.1	1.17	1.1	8.40

### Custom Reports

The user can design and print special reports using the integral Report Generator. Layout designs are saved for future re-use.



### Risk Based Inspection

The RBI modules run in parallel to Criticality. Both can be used independently depending upon requirements.

### Consequence

Analysis of factors includes the Environment, Business and Process. A simple numeric rating is applied to each factor, which builds into an overall consequence rating.

Code	Description	Significance
1	Air Pollution 1	Minor Irritation to Skin, Eyes, Thro.
2	Injury level 1	Minor Injury
3	Shutdown Factor 1	Moderate shutdown and repair op

### Probability

Engineering judgement, UT Trend analysis, Anomaly and Inspection history plus known deterioration mechanisms build up a comprehensive likelihood of failure.

Code	Description	Date	Multi	Sig.	Tot.	
1	CR	CRACK	Mar 10 1992	3	2	6
2	BR	BROKEN	May 29 1992	1	4	4
3	BR	BROKEN	Jun 10 1992	1	4	4
4	EROSION	EROSION	Oct 14 1997	1	1.5	1.5
5	EROSION	EROSION	Oct 23 1997	1	1.5	1.5
6	CR	CRACK	Jan 18 1998	1	2	2
7	EROSION	EROSION	Jan 20 1998	1	1.5	1.5

Cut Off Date: Mar 02 1991      Highest: 6.00

### Risk Rating

The final Risk Rating combines Consequence with Probability. This numeric value can now be used to establish a complete inspection schedule.

### Risk Based Inspection Planning

Inspection intervals and Disciplines can be determined Item by Item or automatically Group by Group.

A user-defined table of Inspection Disciplines and Types of Items gives a relationship between Risk Rating and Inspection Interval. The User establishes Risk Levels, which tie into intervals.

Inspection Type	Item Type	Det. Mech.	RBI 1	Interval 1	RBI 2	Interval 2	RBI 3	In
Dye Penetrant	SPHERE,TANK,VESSEL		7	4.00	15	2.00	20	
General	TANK	CREEP,HF C,I CR H2S	5	3.00	10	2.00	25	
MPI	SPHERE, LINE	NAP,C,FTG	5	5.60	10	4.10	15	
Radiography	LINE	FTG,CD 0	5	3.00				
Thermography	SPHERE,LINE	GALVC	5	3.00	10	2.00	25	

Each item is allocated a sub set of Inspection Disciplines with intervals.

Analysis Information  
 36" WT-2311-1B6s-lu  
 Item Type LINE  
 Deterioration Mech CD 0  
 Risk Rating 8.6  
 1. Radiography Interval 3.0 RBI Level 5  
 2. UT Wall Thickness Interval 4.0 RBI Level 1  
 3. Visual Internal Interval 4.2 RBI Level 1

### Reference Tables

A system of Reference Tables maintains consistent data entry and standardisation. Each key data field such as Material, Product Insulation etc. is related to a standard Reference Table that is controlled by the system Supervisor

#### Available tables include

- Material Specification
- Insulation
- Product
- Process Stream
- Anomaly Code
- Reading Procedure
- Feature Code
- Site/Client

### Summary

Credo-

- Is available in stand-alone or networked format.
- Supports all standard Microsoft Windows conventions and data exchange.
- Can be interfaced with other databases such as Oracle.
- Is a 100% 32bit application.
- Is Year 2000 compliant
- Has an active User Group which support development and training.
- Is used by Offshore Exploration, Refining, Gas Processing, Engineering and NDT companies.

This document describes several of the key features of Credo. For a more detailed information please contact:

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