

WELDCLOUD™ NOTES

TRANSFORMING TRACEABILITY: PETROCHEM GIANT BRASKEM BOOSTS WELD QUALITY USING WELDCLOUD NOTES.

- Improved weld quality through traceability, documentation & compliance practices
- Logistical enhancement of seamless communications between field and office
- Root causes of weld failures identified and related risks greatly reduced
- Thousands of hours saved in document management

Situation

Braskem is the largest petrochemical company in Latin America, the 8th largest worldwide and serves customers in more than 70 countries. Because the petrochemical industry is highly audited, Braskem spends a significant amount of time on compliance and highly values weld quality and traceability. However, the company knew it needed to improve.

Complication

Braskem works with multiple subcontractors to supply welding services. The ability to link weld seam data to specific companies and operator performance had been a challenging and time-consuming task. As a result, the amount of rework was high, adding up to 2 days of time to reweld a 12" (305 mm) diameter pipe with 3/4" (19 mm) wall thickness.

Solution

Braskem selected WeldCloud™ Notes digital software platform and has 32 paid licenses. Ideal for welding engineers, inspectors and quality personnel, WeldCloud Notes streamlines the documentation and reporting process on via online applications. Accessible by computer or mobile device, the software enables Braskem and its contractors to monitor four states of weld production: fit-up, welded, tested and processed.

Results

WeldCloud Notes has helped Braskem improve quality while reducing risk.

“Our new process with WeldCloud Notes allows for full traceability, and we have all the records of all the specs used. The operators now understand that the weld has to be properly done and exact procedures must be followed,” says Josias Thomas, Braskem welding inspector.

“WeldCloud Notes software allows us to monitor welds very quickly. We can identify the status of a weld from any location. We don’t have to wait for field reports. With the software, we can now verify the company and operator responsible for every weld seam.”

— Luis Greggianin, *Braskem welding engineer*





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Can digitization improve weld quality, a process that is inherently manual and analog? Yes, it can, and Braskem is leading the way with its use of an innovative online document management application called WeldCloud Notes.

Braskem, headquartered in São Paulo, Brazil, has used ESAB's WeldCloud Notes to transform its weld quality through traceability, documentation and compliance practices. Root causes of weld failures have been identified. Related risks have been greatly reduced. Contractor performance has improved. And Braskem saves thousands of hours related to document management.

Braskem serves customers in more than 70 countries. Its growth and internationalization strategy are supported by innovation, making Braskem an industry giant. The company continuously seeks ways to streamline and monitor its many operations and supports technology to achieve sustainable development.

Using ESAB's cloud-based application to manage weld quality, procedures and documentation received C-suite endorsement, as well as support and engagement from nearly every department in the organization.

The Problem

As with most petrochemical companies, Braskem employs a team of inspectors, welding engineers and quality assurance personnel to monitor and manage processing equipment. These teams then engage local contractors and maintenance companies to provide welding services. To satisfy traceability requirements of its customers and comply with international standards organizations approved for use in local regulations (ASME BPVC), Braskem and its contractors need to document procedure qualification records (PQRs), weld procedure specifications (WPSs), welder certifications, the actual weld seam and non-destructive testing (NDT) results.

Prior to 2018, documentation at Braskem was largely manual, and managing documentation for the hundreds or thousands of welds made on a weekly basis consumed a lot of time and inherently introduced the potential for human error (such as mistaking a hand-written 4 for a 9 and entering an incorrect value).

Fortunately, Braskem knew it needed to improve its processes to better ensure quality and minimize liability in the event of a weld failure.



WELD DETAILS

Weld Type *
GW - Groove Weld

Base Material 1
SA 1008 - CS Type B - P1 Gr1

Base Material 2
SA 1008 - CS Type B - P1 Gr1

Base Material 1 Certificate
WT75

Base Material 2 Certificate
WT75

WPS
WPS-GTAW-GMAW-1

Is PWHT Required?
 Yes No

PWHT Report

ASME IX WPS
Standard

GW - Pipe
Weld Type

**GTAW
GMAW
GMAW**
Processes

SA 312 TP304 P8 Gr1
SA 312 TP304 P8 Gr1
Base Metals

THICKNESS
SA 312 TP304 16 to 36.58 mm
SA 312 TP304 16 to 36.58 mm
Deposited Metal 0 to 36.58 mm

DIAMETER
≥ 0 mm

GROOVE DESIGN
SINGLE SIDE, GAS BACKING

WELD LAYER CONFIGURATION
MULTI LAYER

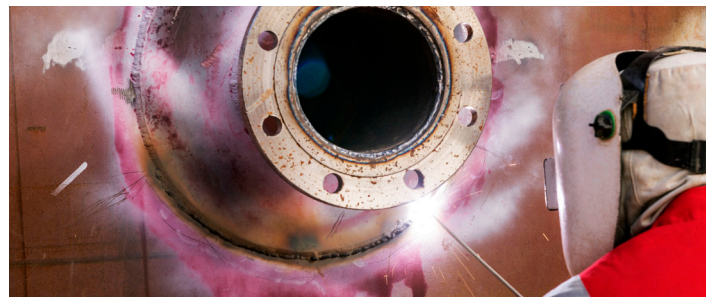
“We didn’t have a system to handle all the documentation. We didn’t have any transparency on the information that we received. We’d only have a huge stack of papers that were dropped on my desk that had to be reviewed,” says Luis Greggianin, Braskem welding engineer. “There was not enough testing or traceability, so our subcontractors would end up sometimes cutting out and redoing the weld. We experienced approximately two rewelds a day, and that’s too much rework, too much time and too many delays in production.”

“We understood that we had to change,” adds Josias Thomaz, a Braskem weld inspector. “This was a risk for our business because all welds are made to handle flammable material. We started exploring ways we could improve in order to create a best-case response to an emergency shutdown.”

The Search

Braskem established a multidisciplinary team to find the best solution to its quality and traceability challenges. With early

support from its Global Welding Leader (an executive position), the team grew quickly and remained motivated to succeed. The departments involved included Engineering, Maintenance (which manages welding), IT and Reliability. Many of these departments operate independently and/or work in different locations, but coming together was essential.



Lack of traceability and poor communication increases welding re-work, being performed here after dye penetrant testing uncovered a flaw.

"I'm usually working in a field office, and the Reliability department is separate from engineering, but the Reliability department financed this solution," says Greggianin. "It was also critical to have IT involved right from the beginning to address data security and for software training purposes."

The Solution

Braskem selected ESAB's WeldCloud Notes digital software platform. The online application is accessible from any web-enabled device, is password-protected and provides a suite of tools and dashboards. Ideal for welding engineers, reliability managers and quality personnel, WeldCloud Notes streamlines the documentation and reporting process by completing four essential tasks:

- Maintain quality and compliance while managing PQR and WPS documents in one place.

"WeldCloud Notes had all the features that we needed and was the most modern platform, so we decided this was the best solution."

— Luis Greggianin,
Braskem welding engineer

- Efficiently review all PQR, WPS and Weld Procedure Qualification (WPQ) information with a quick & easy search.

- Generate a PQR or WPQ with all of the essential variables.
- Avoid a missed qualification deadline or wasted resources requalifying welders.

WeldCloud Notes provides full compliance to construction codes (ASME VIII, ASME B31.3, EN 1090), welding standards (ASME IX, ISO 15614-1, ISO 9606, AWS D.11) and welding quality standards (EN 3834). It enables users to track the productivity of individual welding systems and welders, register weld seam data and manage the calibration records for an entire fleet of welding machines. As an online software tool, every relevant person on a project can access information (with restrictions specified by the administrator), search for the correct PQR and WPS, introduce

WeldCloud Notes centralizes documentation management in a modern online platform.

The screenshot displays two views of the WeldCloud Notes application. The top view shows the 'PROCEDURE QUALIFICATION RECORDS' table, and the bottom view shows the 'WELDING PROCEDURE SPECIFICATIONS' table with a search interface.

PROCEDURE QUALIFICATION RECORDS

Certificate Number	Standard	Process	Base Material	Thickness (mm)
6318	ASME IX	GTAW - GMAW -	SA 335 - SA 335	0 - 24
PQR-2011/109	ISO 15614-1	141 - 121 -	SA 213 - SA 213	0 - 44
GTAW+GMAW-0042	ASME IX	GTAW - GMAW -	SA 106 - SA 106	0 - 24
OMT-002	ASME IX	GTAW - GMAW - FCAW	SA 312 - SA 312	0 - 36.58
OMT - 001	ASME IX	GTAW - GMAW - SAW	SA 312 - SA 312	0 - 36.58

WELDING PROCEDURE SPECIFICATIONS

To add a WPS to the project, search for the WPS number and click the "Add" button
 To add a Project-specific WPS, search for the WPS by number and click the "Create Project WPS" button.

Number	Revision	Standard	Process	Base Material	Thickness (mm)	Add	Create WPS
WN-001-1		ASME IX	GTAW - GMAW - GMAW	SA 312-TP304	16 - 36.58		⊗
WN-001-2		ASME IX	GTAW - GMAW - GMAW	SA 134-SA36	16 - 36.58		⊗
WN-001-5		ASME IX	GTAW - GMAW - FCAW	SA 312-TP304	16 - 60 + 16 - 36.58		⊗
WPS-GTAW-GMAW-1		ASME IX	GTAW - GMAW	SA 1008-CS Type B	12 - 2343		⊗
WPS-2011/109		ISO 15614-1	141 - 121	SA 182-F348H	11 - 44		⊗
WN-001-6		ASME IX	GTAW - GMAW	SA 335-P11	5 - 24		⊗
WN-001-7		ASME IX	GTAW	SA 134-SA36	18 - 40		⊗
WN-001-8		ASME IX	GTAW	SA 134-SA36	18 - 40		⊗
WN-001-9		ASME IX	SMAW - FCAW	SA 182-F348H	16 - 50		⊗

The screenshot shows the 'PROJECT WELDERS' section of the WeldCloudNotes application. At the top left, there is a grid icon and the 'WeldCloudNotes' logo. Below the header, there is a table with the following data:

Name	Stamp	Total Welds	Repairs (%)	Buttons
Sample Welder 5	SW5	0	0 (0)	[Add Certificate] [Remove Welder]
Sample Welder 1	SW1	0	0 (0)	[Add Certificate] [Remove Welder]
Sample Welder 1	SW1	1	0 (0.0%)	[Add Certificate] [Remove Welder]
James Pereira	JP-001	16	3 (18.8%)	[Add Certificate] [Remove Welder]
Sample Welder 5	SW5	16	3 (18.8%)	[Add Certificate] [Remove Welder]
José Almeida	B44	2	1 (50.0%)	[Add Certificate] [Remove Welder]
Sample Welder 3	SW3	1	0 (0.0%)	[Add Certificate] [Remove Welder]

welding records, keep track of production and print reports for all the activity completed.

“We looked into other potential options,” says Greggianin. “A British one, a Brazilian one and a couple of American solutions. In the end, WeldCloud Notes had all the features that we needed and was the most modern platform, so we decided this was the best solution.”

The Pilot

In 2018 ESAB supplied Braskem with technical support and 20 WeldCloud Notes licenses for a pilot project for replacement of parts on a pyrolysis furnace during a scheduled maintenance shutdown. Two subcontractors were initially scheduled to make 107 welds. The reality of working in the field required modifications that led to a total of 297 welds completed and documented. By using WeldCloud Notes, Braskem and its subcontractors could:

- Assist in the verification of each weld.
- Identify which welds required the most repairs and/or extra effort.
- Identify which welds were impossible to repair.
- Develop more accurate repair schedules.
- Calculate costs more accurately.

“Because ESAB provided us with an unlimited demo trial, we could test for multiple hours and understand how it responded and determine any issue that might exist within it. This helped

us quickly move forward,” says Greggianin. “And one important thing was that during the tests and even today, we have never encountered any bug or issue that stopped us from working.”

Acceptance

As a result of the pilot program, Braskem realized, “There were some deficiencies with the welding operators from some of the subcontractors, and WeldCloud Notes helped us identify these issues,” says Thomaz, who helped lead the WeldCloud Notes implementation with subcontractors.

“In addition, we can overview the progress of our subcontractors. There is added transparency to everything, and there is more reliability in our process,” he says. Initially, the subcontractors were reluctant and thought this was just added work. Their opinion changed after they understood that they, themselves, would not have to spend extra time crafting the documentation because everyone involved with the project was using the same software platform.

“The software is also very user-friendly, after using the software and having some training, the contractors saw that it was easy to use and that they had ESAB support at all times. We used the ESAB chat feature to interact, and we got answers in seconds.”

— Josias Thomaz, Braskem welding inspector

Communicating NDT information better ensures adherence to specified procedures.

The screenshot shows the WeldCloudNotes web application. At the top, there is a navigation bar with a grid icon, the logo, and the name 'WeldCloudNotes'. Below this is a secondary navigation bar with tabs for 'Details', 'Dashboard', 'Components', 'Welds', 'Drawings', 'Welders', 'WPS', 'PQR', 'Libraries', and 'Bin'. The 'Libraries' tab is active, and a sub-menu is open showing 'NDT', 'Filler Materials', 'Base Materials', 'Line Class', 'PWHT', and 'Documents'. The 'NDT' sub-tab is selected, displaying a table titled 'NDT REPORTS IN THE PROJECT'. Above the table is a button 'Add NDT Report' and a note: 'In order to add NDT Reports to the Project, you must create them first in the Libraries / NDT Reports menu first. Click here to go to the NDT Reports menu'. The table has columns for 'Report Number', 'Type of Test', and 'PDF'. It lists various reports such as RT-001 (Radiographic Testing), MT-001 (Magnetic Testing), PT-001 (Penetrant Testing), and others, each with a download icon and a note 'Report linked to a weld'.

Braskem decided to pay for their subcontractor’s licenses, which further fostered a positive attitude. Additionally, Braskem’s WeldCloud Notes administrators can segment and limit the data subcontractors can see. Each subcontractor has proprietary information (e.g., WPSs, welding results), and they didn’t want other Braskem subcontractors accessing that intelligence.

Better Traceability – Better Quality

Braskem has now realized that the best approach to reducing the risks associated with weld failures requires creating a more robust and efficient system to increase traceability, documentation and communication internally and with their welding subcontractors. These functions are inherently linked, so a holistic and systematic approach is essential for success (as opposed to managing these functions as independent silos).

Before implementing WeldCloud Notes, Greggianin estimated that failure to comply with the WPS caused 30 percent of the rework cases, and poor supervision, visual inspection or NDT practices caused the other 70 percent.

As an example, he points to pipe welds where operators tried to complete the weld faster by using a single pass instead of multiple passes or used incorrect welding parameters and increased travel speed. In both cases, the supervisor and visual inspection failed to detect the weld flaw, which was ultimately revealed by radiography.

WeldCloud Notes addresses quality issues because it accurately communicates the WPS, non-destructive testing (NDT) methods and NDT documents to field teams. Braskem then uses WeldCloud Notes to document all test results, which are immediately available for real-time assessment.

“The software cannot assist in the inspector’s work, but it helps with the whole process,” adds Thomaz. “Our new process with WeldCloud Notes allows for full traceability, and we have all the records of all the specs used. The operators now understand that the weld has to be done properly and exact procedures must be followed. Overall, they’re happier because they really hate doing rework.”

Greggianin says that, “Everyone involved in the welding processes is more determined to do it properly because of the added scrutiny.

“WeldCloud Notes software allows us to monitor welds very quickly. We can identify the status of a weld — in fit-up, welded, tested or processed and complete — from any location. We don’t have to wait for field reports. With the software, we can now verify the company and operator responsible for every weld seam, and this is very important for us.”



Data Books that used to take days to compile are now generated in minutes.

“We can now verify the company and the operator responsible for every weld.”

— Luis Greggianin,
Braskem welding engineer



Faster and Better

Because the petrochemical industry is highly audited, Braskem spends a significant amount of time on compliance. As an example, the company produces a Data Book that compiles all weld data related to a project. While essential for traceability, producing a Data Book previously required Braskem to print, scan, sign and save all documents, then merge into a single PDF so it could be sent as a digital file. Documentation for an average project consisted of 1,000 pages and took days to compile because the information was scattered throughout the organization and resided with multiple people.

“Before WeldCloud Notes, generating a Data Book of 600 welds for the customer would take one to two days to gather all the information — now it takes 5 to 10 minutes,” says Braskem welding engineer Arthur Scofano.

WeldCloud Notes also generates a document for the Brazilian industry called the IEIS (Instruction for Welding Execution and Inspection) that combines the WPS with NDT and other data. What previously took days to compile now takes a few clicks of a mouse and just minutes to generate.

WeldCloud Notes also improves productivity. For example, during the pilot project, the scope of welding repairs was nearly triple the original estimate. Because of the increased visibility in the welding data, Braskem and the contractor realized that keeping to the original repair schedule would require additional resources. With the need for additional work documented in WeldCloud Notes, the welding teams easily justified the need for additional resources to management.

WeldCloud Notes identifies the status of every weld seam.

The screenshot displays the WeldCloudNotes web application interface. At the top, there is a navigation menu with options: Details, Dashboard, Components, Welds (selected), Drawings, Welders, WPS, PQR, Libraries, and Bin. Below the menu, the main content area shows a timeline for 'WELD - W-012'. The timeline consists of six stages: WAITING, FITTED (18/07/2018), WELDED (18/07/2018), TESTED (11/04/2019), PROCESSED (03/05/2020), and SHIPPED. Each stage is represented by a blue circle with a checkmark, indicating completion. Below the timeline, there are input fields for 'Weld Id' (W-012) and 'Weld Comp. #' (7), both with 'Change' buttons. There are also fields for 'Component *' (4 - 4) and 'Component Drawing' with a 'Download Drawing' button. The interface is clean and professional, with a blue and white color scheme.

The Future

During the pilot program, Thomaz realized that WeldCloud Notes could centralize all documentation so he and others could filter data and create reports much faster. Braskem's corporate purpose is to make people's lives better by creating sustainable solutions through chemicals and plastics. Its manufacturing plan includes expanding its use of software for continuous improvement to its productivity, quality, and product.

"We have weekly meetings where we share our feedback. The ESAB team shares their roadmap, and we explore ways to improve the software together," says Greggianin, and we will want to grab from

"We want to embrace Industry 4.0 and grab data from the power sources as well."

— Luis Greggianin,
Braskem welding engineer

the power sources as well, which may mean using more software from ESAB's WeldCloud suite of products."

Another great benefit for the future would be to integrate WeldCloud Notes with other systems," says Greggianin. "We use SAP for many things in the company. We also have a document management system that we feel would pair nicely with all the documents generated in WeldCloud Notes.

We are fortunate to work with a company like ESAB that is open to exploring new possibilities with us."

ESAB offers digital solutions for operations, production and service managers, WeldCloud-enabled machines, a Universal Connector that works with every brand and handheld scanners for use on the production floor.



Security

The petrochemical industry is hyper-sensitive to cyber-security attacks and securing its proprietary information. With ESAB's WeldCloud technology, users can only access their data via a username, an intricate password and multi-factor authentication, and they can easily define different levels of access to their users or user groups.

Data for ESAB's WeldCloud Notes is managed through Microsoft Azure. The multi-tenant, geo-distributed, high availability design of Azure means it is reliable for the most critical business needs. Working out of 28 data centers around the world with automated failover, Azure AD is highly reliable even if a data center goes down. Copies of customer's data reside in at least two or more regionally dispersed centers and are always available for instant access.



WeldCloud™



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