



Belman



The Ultimate Guide to

REFURBISHMENT
OF EXPANSION JOINTS

BENEFIT FROM
EXPERIENCE &
GET TIPS AND INFORMATION
ON **REFURBISHMENT**

ABOUT BELMAN & REFURBISHMENT

Belman is a team of highly experienced engineers. We specialize in finding the right Expansion Joint solutions for clients in many different industries. Regardless of whether the right solution for the client is replacing the complete Expansion Joint or to make a refurbishment, we will ensure the client receives the best solution. Belman is globally active and works tirelessly to ensure the client significant value from the Expansion Joint solution provided. By involving Belman at an early stage the client can realize project cost savings.

Since 1994

Since the foundation of Belman A/S in 1994, the company has established itself as a leading designer and manufacturer of highly engineered and customized Expansion Joint solutions for critical applications. Through many

years of successfully solving challenging operational problems for clients in many different industries worldwide, Belman has built up a vast knowledge and experience on Expansion Joints.

Refurbishments

Through the years Belman has done many refurbishment projects. From experience gained in these projects Belman often promotes refurbishment as a good solution if the Expansion Joint contains heavy steel constructions.

Ultimate Guide to help

This Ultimate Guide will explain in detail when refurbishment is a good idea, provide a useful check list and clarify the refurbishment process. We hope you will find this Ultimate Guide useful.



INDUSTRIES WE HELP ON REFURBISHMENTS

Through the years we have worked with:

- **Petrochemical industry**
- **Power industry**
- **Steel industry**
- **Chemical industry**
- **Engineering, Procurement and Contracting companies (EPC)**

WHAT IS REFURBISHMENT & WHEN IS THIS THE BEST SOLUTION

HOW IS THE REFURBISHMENT PROCES

What is Expansion Joint refurbishment?

Refurbishment (also referred to as repair, sanitation, modernization) is when certain parts of the Expansion Joints are re-used and some parts are scrapped and new parts are produced. The parts that will be re-used are often sand blasted and painted and then appear as new. These re-used parts are then welded together with the new parts. Please find here a useful list of parts that are often made as new/ replaced as well as parts that are re-used:

New parts/replaced parts:

- Bellow/-s
- Inner sleeve/-s

Re-used parts

- Welding ends
- Flanges
- Gimbals
- Hinges
- Sometimes inner sleeves too
- Other hardware

When is refurbishment the best solution?

Through the years Belman has done many refurbishment projects. Having learned from these experiences Belman often promotes refurbishment as a good solution if the Expansion Joint contains heavy steel constructions in carbon steel or stainless steel, such as thick walled welding ends, thick walled flanges and other hardware like gimbals etc. Please refer to the next pages to read about the advantages of refurbishments and the cost benefits.

QUOTATION & GUIDANCE PROCESS

Guidance and quotations on Expansion Joint Refurbishment can be done in the following ways:

Scenario 1

Client requests refurbishment

The client contacts Belman for assistance on refurbishment and knows exactly what they want to be refurbished and the time frame for it. In this situation Belman adapts to this plan and prepares a quotation for the client. If we see any advantages the client could gain by changing minor things Belman will always advise the client.

Scenario 2

Pre-inspection on-site

Belman staff and/or Belman partners perform an on-site inspection and examine the Expansion Joint in question, evaluating and discussing options for refurbishment. Following this inspection Belman will prepare a quotation and time frame estimate for the client.

Scenario 3

Benchmark

If the client is unsure whether refurbishment is the best solution Belman can make a quotation and time frame on the refurbishment work and a second quotation on a completely new Expansion Joint. In this way the client can compare both options.

Scenario 4

Custom scenario

If the client request is not described in the scenarios above, Belman can discuss a custom scenario that meets the exact needs of the client.

COMMUNICATION TYPE

In all situations and scenarios Belman or our partners can undertake:

- **In person on-site pre-inspection**
Pre-inspection and discussion of options with the maintenance staff on-site. All on-site inspections and work is of course done in accordance with prevailing regulations, restrictions and precautions.
- **In person meeting at client facility**
Meeting with the client in person discussing the options based on photos, drawings and information given by the client. All meetings in persons are naturally done according to prevailing regulations, restrictions and precautions.
- **Remote assistance**
Remote assistance based on received photographs, explanations, specifications and drawings via e-mail, MS Teams meetings and telephone conversations can enable Belman to advise options and provide a quotation.

The form of communication and process is chosen by the client.

THE REFURBISHMENT JOB

Refurbishment can be done in several ways:

Scenario 1 Refurbishment at the Belman facility

In most cases refurbishments are done at Belman's facility. The exact procedure can be seen in the next pages. The client will disassemble and send the Expansion Joint to Belman, Belman will then refurbish and return to the client for re-installation.

Scenario 2 Refurbishment onsite

On-site refurbishments completed by the Belman team will in most cases be a replacement of the bellow and inner sleeve, as there are no options for sand blasting. In this way bellows and eventual inner sleeves are new, whereas the connections and hardware will continue operation. Please be aware that these may have been affected by corrosion. However, a pre-inspection report can clarify this. Furthermore, keep in mind the required space need for welding.

Scenario 3 Custom scenario

If your request is not described in the scenarios above, Belman can discuss a custom scenario that meets the exact needs of the client.

HOW THE REFURBISHMENT IS DONE



1. Pre-inspection, meetings and quotation as well as time plan is defined in agreement with the client needs.



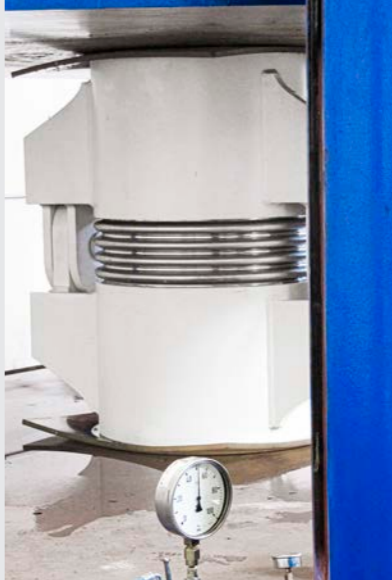
2. Receiving the items for refurbishment



3. Disassembly



7. Assembly/welding



8. Test: Pressure test, tightness test, X-ray and other tests as requested



9. Completed Expansion Joint



4. The new bellow is made followed by the inner sleeve



5. Sand blasting of connection ends and hardware that is to be reused. Further preparation for welding.



6. Painting



10. Expansion Joint ready for dispatch. Belman can also arrange transport for the client should they require.



11. After arrival at site, the Expansion Joint can be re-installed and the line can go back into operation

HELPFUL CHECK LIST

For Expansion Joint refurbishment inquiries the following information is important:

1st. priority

SITUATION INFORMATION

- Photos of Expansion Joint in question and explanation of status
- Drawings and specifications of Expansion Joint in question
- Eventual reports made on the Expansion Joint situation
- Information on client preferences; new Expansion Joint or refurbishment
- Requested time line, deadlines and eventual urgency
- Is on-site pre-inspection and/or discussions needed?

IF REFRUBISHMENT ON-SITE

- Space around the Expansion Joint
- Availability of Lifting equipment
- Time frame to complete the refurbishment and what is the deadline
- Access to compressed air, electricity, protective gasses etc.

2nd. priority

EXPANSION JOINT INFORMATION

Need to know:

- Size
The diameter if the Expansion Joint is round and height & width if rectangular. If the Expansion Joints are sent to Belman for refurbishment, the measurements can be done by us once they arrive.
- Operating & design pressure (barg)
- Operating & design temperature (degC)
- Type of movement & amount of movement (+/-mm) and/or (+/-deg)
- Material requirements
- Space around the Expansion Joint (important to know if the refurbishment has to be done on-site otherwise not relevant)
- Design code
- NDT, certification on replacement parts, documentation requirements

Nice to know:

- Media
- Drawing of the Expansion Joint in question
- Design of the Expansion Joint in question
- Where in the pipeline is the Expansion Joint in question placed/installed
- Spring rates
- Flow velocity
- Photos of the Expansion Joint in question

ADVANTAGES & COST BENEFIT

COST BENEFIT

As a general rule refurbishment is more cost-efficient than exchanging the complete Expansion Joint if the Expansion Joint is:

- Tied, hinged or gimbal with heavy steel parts (such as Angular Expansion Joints, Lateral Expansion Joints and special designed constructions containing significant amounts of carbon steel/stainless steel)
- If the bellow is a small part of the Expansion Joint (meaning it has a large surface area of carbon steel/stainless steel)

As a general rule a full replacement of the Expansion Joint is the most cost-efficient solution (no refurbishment) if the Expansion Joint is:

- A simple Axial Expansion Joint or Universal Expansion Joint, where the bellows are the main element of the Expansion Joint
- If the Expansion Joint have thin walled flanges, welding ends

ADVANTAGES

OF REFRUBISHMENT

- No external crew required at the plant
- The best and most cost-efficient solution is ensured
- Only critical work is made on the Expansion Joint
- Expansion Joint experts verify and guarantees future service life of the Expansion Joint
- Extremely short down time of the plant
- Ultra-fast refurbishment is possible
- Short downtime
- Cost-savings, typically only the bellow needs to be replaced
- Less scrap and thereby more environmentally friendly
- Good technical solution with new service life.

IMPORTANT INFORMATION!

The connection ends and hardware such as gimbals should be checked for any corrosion, this would lead to a shorter service life despite refurbishment. In this case cost benefits can be improved by the total replacement of the Expansion Joint.



NEED ANY HELP?

Belman will be glad to guide you on refurbishment and alternative options at any time



YEARS OF EXPERIENCE...

REFERENCES & CASE STORIES



REFERENCES FOR REFURBISHMENT **WORLDWIDE**



Belman has successfully assisted clients across industries worldwide on refurbishment projects both on-site and at Belman facilities. These references confirm our abilities as a committed, problem-solving and experienced partner.

Selected references are:

**BP • Evonik • Corus (now TATA) •
E.ON • Kraftwerk Mehrum •
Proviron • RWE • Vattenfall**

A full experience list highlighting our references can be forwarded on request. Furthermore, detailed information can be given on projects that are not restricted by any NDA (Non-Disclosure Agreement).

Also interesting...

BELMAN GENERAL
REFERENCES FOR
EXPANSION JOINTS

[www.belman.com/
references/](http://www.belman.com/references/)



CASE STORY

CLIENT BENEFITS FROM QUICK & COST-EFFICIENT REFURBISHMENT

In some situations, it is not possible to allow external on-site teams into the plant to replace and/or refurbish an Expansion Joint. Furthermore, in certain cases it is not necessary to replace the entire Expansion Joint. If only the bellows are at the end of their service life and the other components are still in good working order, it is usually cheaper to just replace the bellows. It can be easier, faster and more efficient to demount the expansion Joint/-s and ship them to industry experts for refurbishment. This is what a German district heating pipeline owner decided to do for their 25 Expansion Joints in question.

Cost-efficient solution

The district heating pipeline operated with a high pressure, which means that the hinges and welding ends were sturdy and clearly represented the highest value in the construction. The client therefore asked Belmans expert team whether it would be possible to reuse these parts and simply replace the worn out bellows. After inspecting and analyzing the Expansion Joints at their arrival in our work shop, Belman found that the hinges and welding ends had not been damaged by corrosion despite many years of operation (the Expansion Joints were about 35 years old). Belman was able to inform the client that the components were fit for reuse and

simply required surface treatment. Being able to just replace the bellows and recondition the fittings resulted in large savings for the client compared to buying brand new Expansion Joints. At the same time, they saved money by removing the need for external on-site crew.

The replacement

The Expansion Joints were removed during a planned shutdown and shipped to Belman. In some cases, the replacement can take place on-site, if external workers are allowed access. However, in most cases it is preferable to have this work carried out at the manufacturer's premises. The replacement involved dismantling the old Expansion Joints, cutting out the old bellows and removing the pins. The old welded parts (welding ends with hinges and pins) were sand-blasted and the old welds were cut off. Following this, they were ultrasonic inspected for stratification and checked for ovalization.

The new bellows were welded in and the Expansion Joints were reassembled. All the old steel parts were then surface treated. Selected Expansion Joints were pressure tested at 48.8 bar (corresponding to a reaction force of over 234 tons). Finally, the Expansion Joints were packed and returned to the client for refitting.



Benefit for the client

- No external crew needed on-site
- The best and most cost-efficient solution is ensured
- Only critical work on the Expansion Joint is made
- Experts on Expansion Joints verifies and guarantees future life time of the Expansion Joint
- Extremely short down time for the plant





CASE STORY

AS GOOD AS NEW WITH FAST REFURBISHMENT OF EXPANSION JOINT COMPONENT

In some situations, it is not possible to allow external on-site teams into the plant to replace and/or refurbish an Expansion Joint. Furthermore, in certain cases it is not necessary to replace the entire Expansion Joint. If only the bellows are at the end of their service life and the other components are still in good working order, it is usually cheaper to just replace the bellows. In some cases, it is easier, faster and more efficient to demount the expansion Joint/-s and ship them to industry experts for refurbishment. This is what a German oil refinery decided for their special Expansion Joint component incorporating a bellows.

Cost-effectient solution

The owner of the oil refinery had an urgent need for exchanging the worn-out bellows in this component. It was demounted and send to Belman, who quickly disassembled, made new bellows, assembled the unit again and shipped it back to the client. All this was done in just 4 days.

As good as new

With this new bellows, the unit was good as new again - and starting a new service life.



Benefit for the client

- Ultra-fast refurbishment
- Short downtime
- Cost-savings, as only the bellows needed to be replaced
- Less scrap and thereby environmentally friendly
- Good technical solution with new service life





WHOM TO **CONTACT**

Should you need help in regards to technical questions, guidance on best choice, inquiries and/or

refurbishment plans, please do not hesitate to contact our experts on Expansion Joint refurbishments:



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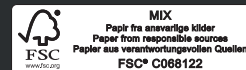
Klaus Hein Sørensen speaks:   






PARTNERS OF BELMAN

Belman works with a network of competent partners that can assist in your country. For more information on these partners, please contact Belman: belman@belman.com

Our experience, your benefit



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