



**STRESS RELIEF ENGINEERING**

## Case Study Prensas (Presses) ABM, Spain

**Customer: Prensas ABM**

Polígono Industrial Lentiscales. C/ Corcuetos, 16  
26370 – Navarrete (La Rioja), Spain  
Tel: 941440712  
Web site: [www.prensasabm.com](http://www.prensasabm.com)

**Responsible:** Angel Medel

**Company:** Press Manufacturer



**Initial Situation:** The chassis of the ABM presses are welded structures which need to be machined before the installation of the additional pieces (guides, zippers, etc.). The welded chassis were sent to the furnace to be heat treated. ABM knew that some of its competitors in Spain had opted for relieving stresses by the Formula 62 vibration method (and were now more price competitive) and decided to ask Metronic for a bid.

ABM had a typical "problem". Their annual expenditure on transportation and heat treatment was enormous. They were looking for a more economic alternative. The pieces that require stress relief weigh between 5 to 10 tons and are heavily welded, resulting in severe mechanical stress.

**Challenge:** ABM knew that their objective of saving on transportation and oven costs was possible because they had already received referrals from other users who were very satisfied with the vibration treatment, but they raised another very interesting challenge.

On the chassis of the press are welded subsets which need to be machined with great accuracy. These subsets have a high proportion of welding thereby generating great stress. When the pieces returned from the oven it was noticed during machining that some deformations occurred, caused by tensions that the oven had not been able to reduce sufficiently.

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## **Case Study Prensas (Presses) ABM, Spain**

**Solution:** The solution to their transportation problem was clear: the purchase of a Formula 62 machine. That was already settled. What remained was the challenge to reduce tensions in critical areas. The solution was as follows: since the piece was leaving the welding department with a large accumulation of tension from welding the chassis, we recommended applying vibration **during** and **after** the welding.

Applying a gentle vibration while welding (enough to not disturb the operator) provided tension relief as it was occurring. At the end of the welding process, the piece was stress relieved once more. The results were excellent and the difficulties that occurred when machining these critical areas of the piece were eliminated.

**Conclusion:**

ABM has been using "Formula 62" for over a year and is 100% satisfied. ABM considers vibratory stress relief treatment a real alternative to the oven. It has allowed them to eliminate the costs of heat treatment and transport and reduced the delivery time of their product.

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## Case Study Benecke Irmãos & Cia Ltda, Brazil

**Customer:** Benecke Irmãos & Cia Ltda

Rua Fritz Lorenz, nº 2170 – Timbó – SC.

Website - [www.benecke.com.br](http://www.benecke.com.br)

**Responsible:** Alix – Production Supervisor

**Company:** Manufactures steam boilers, water heaters, boilers feeding and transport systems, wood kilns and dryers, veneer jointers, finger jointers, veneer restorers and other machines for wood working.



**Initial Situation:** The machine bodies are manufactured from carbon steel sheets with thicknesses varying from ½” to 1½””. Due to the length, which is often over 3 meters, the sheets require oxy cutting and reinforcing to maintain resistance.

**Challenge:** Warping and distortion occurs on the large work pieces which are predominantly welded. The intense use of the equipment also causes splitting due to fatigue and these tensions need to be treated. Until now the only method Benecke used to treat the pieces was with heat treatment. However, the cost of oven heat treatment has recently increased so they sought alternative methods and subsequently discovered the Formula 62 method.

**Solution:** Benecke approached Mr. Michel Zeller, an industrial consultant who had seen Formula 62 demonstrated in other companies and he recommended the system. A machine was sent for demonstration and was used on the support of a cutting knife for woodwork. The piece was 3 meters long and weighed 500kilos. It was recommended to apply the vibratory stress relief machine during the whole welding process, because the welding was intense. Using Formula 62 this way helped avoid distortion. After the welding was completed, Formula 62 was applied manually for 5 minutes at the natural point of resonance resulting in the support having a minimum distortion which straightened after milling. By using this method, Benecke avoided sending the piece out for treatment, which saved a week’s time, and saved another three days not having the piece sent to the machine shop for straightening before milling. The operators were comfortable using the machine after only an hour’s explanation of the process.

In virtue of the success of the test, Benecke bought the equipment and plans to use it on many other pieces, such as motors, machine bases and cylinders used in heavy duty milling. They especially liked having the stress relieving process recorded on the chart paper, enabling them to integrate the results into the construction process manual of the part or machine they are producing.

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## Case Study Duraferro Ind. E Com. Ltda., Brazil

**Customer:** Duraferro Industria e Comercio Ltda.  
Estrada Municipal Araras Elihu-Root  
Araras, Sao Paulo, Brazil  
[www.duraferro.com.br](http://www.duraferro.com.br)

**Responsible:** José Luiz de Oliveira - Quality Control Technician.

**Company:** Brazilian manufacturer of large overhead traveling cranes, Gantry cranes, shears for steel plate, and other large equipment for iron and steel mills. Almost all the pieces that Duraferro manufactures are made of welded carbon steel sheets. The company has more than 20 years of expertise and its own team of experienced project engineers executing mill equipment projects for both domestic and international markets. Their own equipment is supplied by their partners, Morgan Construction Co, a well known U.S. manufacturer of shears, complex Stelmor lines, rollers, transport tables and other large equipment for steel mills.

**Initial Situation:** Overhead cranes need to span large gaps, often up to 40 meters, and must be robust enough to operate in the hostile, hot, intense work environment found in a typical steel mill. Therefore the equipment must be manufactured to the highest standards, to be flawless so as not to compromise the high safety standards, and to withstand the rigorous conditions in the mills.

Mills include the need for stress relief treatment in their product specifications. It is understood that the inherent tensions produced during the welding process need to be adequately treated to ensure the absence of cracks, fatigue or misalignment of any parts of their equipment, thus enabling the equipment to be used for long periods of time with no maintenance.

**Challenge:** During the manufacturing process the pieces suffer distortions and warping. Much time and money is lost on having to transport the piece to third - party owned ovens for heat treatment, then re-align the piece in the presses.

**Solution:** After learning their requirements, it was suggested applying the Formula 62 stress relief treatment according to the individual characteristics of each piece. With pieces which have slim dimensions and no concentrated welding, such as the large steel box-type pieces manufactured by Duraferro, manual treatment was suggested. The method used was to find the resonant frequency and then treat for the time calculated based upon the weight of the piece.

Photo 1 shows a steel piece three meters long and weighing 4 tons which was treated with Formula 62 on manual mode resonance frequency for 12 minutes at the end of every workday. After the work piece was completed, it showed a diagonal distortion of an acceptable 2 mm.

**Without treating with Formula 62, earlier work pieces would distort more than 30 mm on the diagonal, which would then require additional work re-aligning the whole work piece with a welding torch.**

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Form: SRE/CS/VW-MEX

## Case Study Duraferro Ind. E Com. Ltda., Brazil

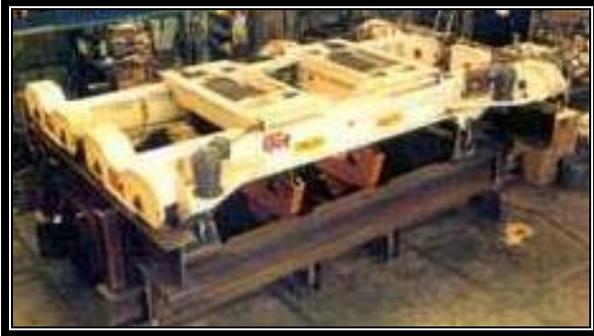


Photo 1

On other pieces, where many welding processes were concentrated in a small area, the Formula 62 was applied during the welding process. The frequency chosen was one lower than natural resonance, but as high as possible to permit the welder to work in comfort and safety. The welder was positioned on a platform independent of the Formula 62 machine, so as to remain comfortable and not tire quickly. At the end of the workday the piece was treated again on automatic mode for 15 minutes. A typical example where this technique is used is shown in photo 2. It is a reinforcement frame which links the bridge to the truck on an overhead crane. This "T" shaped work piece weighs 300 kilos, and is composed of 1½" steel sheets welded at a 90° angle. **Without treatment, when completed, this type of piece would show warping in the middle of the piece of 50-60mm in a one meter span.** However, after the introduction of the Formula 62 method as described above, distortion was reduced to approximately 8 mm, which was easily straightened under an aligning press.



Photo 2

Due to the need to prove that stress relief was applied to the pieces, an alternate treatment method was also used. Formula 62 was applied manually for 5 minutes at the end of every workday and the resulting graphic paper register integrated into the manufacturing file of each overhead crane or piece made by Duraferro Ind. e Com. Ltda. **Using the Formula 62 stress-relieving method shortened the manufacturing process by at least a week, therefore saving both time and money. In the past it would have been necessary to send the pieces outside to another company to be heat-relieved before straightening under an aligning press.**

## Case Study Dürr Equipamentos Ltda, Brazil

**Customer: Dürr Equipamentos Ltda**

R. Arnaldo Magniccaro, 500  
São Paulo, SP. Brazil CEP: 04691-903  
Tel: +55 11 5633-3500

**Responsible:** Mr. Jorge A. Castro – Manufacturing Supervisor

**Company:** The Dürr Group is a leading supplier of complete systems for final automobile assembly. They have a wide product range which enables them to deliver 70% of all the equipment needed for final assembly. They also provide engineering services for the automotive industry including factory design, such as final assembly lines, testing centers and infrastructure.



**Challenge:** The Dürr Service Center Department supplies complete support for the Daimler-Benz plant in Juiz de Fora, Brazil. Their assembly line consists of 116 skids. The skids, which carry the car frame along the paint line, were modified and welded. The stress on the frame from these procedures required stress relieving according to Daimler-Benz's specification. These skids cannot be distorted otherwise the vehicle frame doesn't align correctly and the assembly line halts. The stress relief was completed by sub-contracted companies but it was not only very time-consuming but also expensive.

**Solution:** Dürr decided to buy a Formula 62 machine to shorten the time needed to perform the stress relieving process. The Formula 62 machine was applied at several points during the manufacturing of the skids. For example, during the welding of the skid structure then again after the skids were measured and bolted over a table which adjusting specific alignment bolts. In addition, by owning their own Formula 62 machine, Dürr is able to utilize the machine in other automotive plants where immediate stress relieving with short delivery times is mandatory.

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## Case Study Metalúrgica Souza Ltda., Brazil

**Customer: Metalúrgica Souza Ltda.**

Av. Vitorino Arigone, 303  
Limeira – SP - Brazil  
CEP: 13480-309  
Tel/Fax: +55 19 3451-4470  
<http://www.metalurgicasouza.com.br/>

**Responsible:** Eng. René Margarido Jr

**Company:** Manufacturer of hydraulic and eccentric presses. MSL produces heavy hydraulic and eccentric presses up to 400 tons. The factory is divided into 3 sections; fabrication, machining and foundry. The presses are designed to support heavy duty cycle work. They are made of low carbon steel sheets with thicknesses varying from 3/8” to 2”. These complex steel sheet parts are welded together to reinforce the main body and hammer.

**Challenge:** The heavy heat input added by the welding process results in stress and distortion to the frame of the press. According to MSL, problems such as control alignment when machining and distortion along press work life could occur. Furthermore, fatigue resistance was low and cracks appeared, therefore stress relieving is necessary when manufacturing these presses.

MSL was heat treating the work pieces outdoors. Of course the cost of heat treatment was dependent on the price of gas, which rises annually and the size of the piece to be treated. At the same time the design of the frames are becoming heavier in order to meet the market demand for higher press capacity and performance.

**Solution:** Eng. René and his technical team researched alternatives to heat treatment and decided to purchase a Formula 62 machine. The first press to be treated weighed 32 tons and was 4 meters high. The piece was isolated with wood beams to allow for the proper resonance point and vibration was applied during the welding process. A moderate vibration around 40 (Formula 62 dial scale) was selected and 15 minutes of automatic vibration was applied at the end of the work day.

In the next stage Formula 62 was applied to machine sleeves and others parts. Of course the pieces were measured and the alignment easily met specifications. The technicians were pleased to no longer have to apply localized heat using oxi-gas flame as it was so time-consuming.

MSL was satisfied with the results of the Formula 62 stress relieving machine because they saved both money and time during the manufacturing process. On their first application, **MSL shortened their manufacturing time by 20% to 30%.**

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## Case Study Newton Ind. e Com. Ltda, Brazil

**Customer:** Newton Industria & Comercio Ltda

R. Lourenço Emelino Masutti, 500

São Paulo, SP. 13480-970 Brazil

Tel: +55 19 2114-3404

**Responsible:** Mr. Rodrigo – Engineering Supervisor

**Company:** : Newton manufactures hydraulic guillotines and presses for cutting, folding, shearing and slitting metal, sheet metal expanders and sheet metal working machines for steel sheets with thicknesses of up to ½” and lengths of up to 6 meters.



**Initial Situation:** Newton has used the Formula 62 vibratory stress relief system since they bought their first machine in 1993. Today they are buying their third machine. They find the system is perfect for use during the manufacture of the guillotines and presses, including the heavy sliding work pieces which need to be perfectly aligned and able to maintain alignment for many years of intense use.

**Challenge:** Newton used to use heat treatment to alleviate the tension and stress during fabrication, but only on a few pieces. Many of their pieces were simply not treated at all due to the high cost of the treatment and the time delay of treating each of the pieces. The untreated machines required constant repairs and realignment, which increased their costs and caused their disappointed clients to complain about quality.

**Solution:** System Formula 62 was introduced into the fabrication process, and applied to all welded and worked pieces to control the distortions, warping and prevent fatigue. After more than 15 years experience using Formula 62, Newton is convinced that without the system they would not have achieved the high level of quality for which they are known in both the Brazilian market and through their worldwide exports. The speed of treatment also helps them reach their high volume of production because the stress relief treatment is integrated into their production process.

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## Case Study Teme Engineering Ltd., Canada

**Customer:** Teme Engineering Ltd.  
323 Glover Rd  
Stoney Creek, ON , Canada

**Responsible:** Mr. Paul Halpin - President.

**Company:** Canadian engineering company specializing in the manufacture of assembly line products for the automotive industry.

**Initial Situation:** Teme needed to manufacture 650 paint skids for the automotive industry, for Chrysler Group. Paint skids guide the cars through the paint shop line and must be built to exacting standards due to the need for precision in the painting process.

**Challenge:** During manufacturing, after welding in the fabrication shop, small distortions were occurring in the skids. Normally these pieces were sent out to be relieved by the thermal method causing delays in the manufacturing process.

**Solution:** After a recommendation from GTS Nationwide in the UK, who manufacture similar skids and use the Formula 62 machine, they bought a machine from us. It was the first time that Teme had used any sort of stress relief "in-house". According to Mr. Halpin he found Formula 62, "easy to use, no issues, came with instructions, removed them from box and started to use the machine" and that he is very happy with the machine and will use it again on future contracts as required.

**Using the Formula 62 stress-relieving method shortened the manufacturing process for Teme. They no longer needed to prepare and ship the pieces outside to another company to be heat-treated.**



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## Case Study Volkswagen de Mexico

**Customer:** Volkswagen de México, S.A. de C.V.  
Autopista Mexico-Puebla, Km 116  
San Lorenzo Almecatla  
Cuatlaningo, Puebla, 72008  
Mexico  
[www.vw.com.mx](http://www.vw.com.mx)

**Responsible:** Eng. Arturo Achard

**Company:** Volkswagen México is part of the Volkswagen Group of automotive and truck manufacturers. In Mexico, the factory produces the Jetta, Bora and Beetle car models. They have two Formula 62 stress-relieving machines.

**Initial Situation:** This particular machine has been in use since March 1999 in the construction shop during the manufacture or mounting of different parts and devices. (Workshop 5 area A-5 – 32) The results have been highly satisfactory.

**Challenge:** Volkswagen requires absolute accuracy on their assembly lines. There is no room for warping or distortion on any of their vehicle components. During manufacturing, many of the components were suffering distortions and warping from the welding and cutting processes.

**Solution:** Volkswagen de Mexico introduced Formula 62 Stress Relieving Machines to eliminate the tensions that occur with electric or oxyacetylene welded pieces.

Examples of Volkswagen's use of the machine are on machined pieces, to normalize drive shafts on air generators and in the manufacture of the chassis where the car frame attaches. In each corner of the chassis is placed a tier of pieces of wood ranging from 1 to 3 tons in weight. This supports and isolates the vibration while the Formula 62 machine is run for 15-30 minutes.

**Comments:** Excellent results. It is very effective and easy to use.



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## Case Study Arcelor, Spain

**Customer:** Arcelor España, S.A  
Veriña-33280  
Gijón, Asturias  
Spain  
[www.arcelormittal.com](http://www.arcelormittal.com)

**Responsible:** Mr. Velasco (Maintenance Engineer)

**Company:** Iron and Steel Company

**Initial Situation:** In our visit to the Central Maintenance Shop at Arcelor, we found that the repairs were done using welding methods that produced stress and bending.  
The type of metal used was st37/2 st45/2 and the pieces weighed between 1000 and 5000 kilos.



**Challenge:** All work pieces were heat treated in an oven which required a major investment in both time and money.

**Solution:** We informed Arcelor about the vibrating method of Formula 62; we demonstrated how it works, the optimum results achieved, and the company purchased the F-62 machine. Using the Formula 62 machine, Arcelor has found it only necessary to perform **30 to 60 minutes of work to result in savings of around 6,000€ per year**. Formula 62's vibratory stress relief method is being used ever since without considering any alternative.

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## Case Study Casado, Spain

**Customer:** C.M. Casado, S.L.  
S. Martin De Valdeiglesias Km1  
Alcorcon 28925  
Madrid  
Spain

**Responsible:** D. Jesus Casado

**Company:** Metallic Constructions

**Initial Situation:** Casado manufactures columns for troughs of iron and steel. The approximate dimensions of the columns are 14 meters (45.93 ft) long with weights of 10 tons. The materials used are: ST37/2; ST45/2; AISI 316; AISI 321; AISI 304. Due to both the large amount of welding cords in each column, and its length, bending occurred.



**Challenge:** Because of the problem of loading and unloading the pieces and the distance to travel to transport the pieces for treatment in an oven, Casado opted to try the vibratory stress relief system at one of their installations. Heat treatment in an oven was taking approximately 1 day with a cost of 1,200 € per column.

**Solution:** After using the Formula 62 method, the columns did not show the previously mentioned bending; consequently Casado decided to buy a F-62 machine. The bending is not compared. (Photo)

The machine is applied for approximately 1 hour and it is applied in sections. By changing to the Formula 62 stress relieving system **the company saves over 12,000€ per year.**

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## Case Study IMASA, Spain

**Customer:** IMASA, Ingeniería Montajes y Construcción  
Palacio Valdes, 1-1<sup>o</sup>-33002  
Oviedo, Asturias  
Spain  
Tel: 985227585  
Fax: 985222598

**Responsible:** Benigno Valdes Blanco

**Company:** Manufacturer of equipment goods, forging and mechanization.

**Initial Situation:** Torpedo for the transportation of liquid steel from the ovens to the lamination area for Acelor. The torpedo measures 14 meters (45.93 ft) long by 4 meters (13.12 ft) in diameter, and weighs 32 tons. The material used is P355gh(1.04.73) according to the UNE norm at 1.0028 40 mm of thickness.



**Challenge:** Welding is used often in the production and repairing of the torpedo; therefore stresses and cracks are generated. To avoid these problems thermal treatment was applied. It was very expensive and resulted in long delivery times due to the lack of availability in the ovens for such large capacity pieces. The cost of heat treating these pieces in an oven is approximately 5,000€ and requires 48 hours of treatment excluding transportation time and expenses.

**Solution:** We contacted the quality control department of IMASA, and offered to use the F-62 vibration method. After successful tests by IMASA's Quality Control department, they approved the system and purchased the Formula 62 equipment. The machine is used on the torpedo pieces and requires only 2 hours of work in each of 4 sections for a total of 8 hours **instead of the previous delivery delays, 48 hours of treatment and cost of over 5,000€**

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## Case Study DOMEM, Spain

**Customer: DOMEM**

Polígono La Ermita, ships 2 and 9.  
50171 - La Puebla de ALFINDEN (Zaragoza)  
SPAIN  
Phone: 976107732  
Web site: [www.talleredomem.com](http://www.talleredomem.com)

**Responsible:** Domingo

**Company:** Welding work in general

**Sector:** Outsourcing



**Initial Situation:** Domen did not know about the vibration method of stabilization. When a customer requested an estimate for a welded structure that needed stabilizing, they quoted for transporting the pieces to be heat treated in a furnace approximately 300 kms. away. The cost of transportation and heat treatment was always a major portion of their bid.

**Challenge:** Fagor, a large domestic and commercial appliance manufacturer and part of the group of companies MCC Mondragon, asked for a quote for a series of cuts on presses they build. Fagor required all pieces to be stabilized after the work was completed. Domem's quote to Fagor included the cost of heat treatment. Fagor rejected the quote, and requested stabilization by vibration. The challenge was to get Fagor's order and start working regularly for them.

**Solution:** Domem contacted Metronic and bought the Formula 62 machine to stabilize a series of pieces like the one in the photo above. Fagor accepted their new bid and are now regular clients of Domen. Domem's concerns about the effectiveness of the machine were completely dispelled thanks to the high degree of satisfaction from Fagor.

**Conclusion:** Domem does not use the F62 machine only for the pieces that it makes for Fagor. Today, by using the Formula 62 machine, they save by eliminating both the transportation and furnace costs. These savings make them significantly more competitive compared to other companies in their area which, like them, work for other, bigger companies. Domem now supplies all welded pieces stabilized to their clients. Their prices are competitive and the work of premium quality. This policy has represented an increase in Domem's customer portfolio.

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## Case Study Juaristi, Spain

**Customer: JUARISTI**  
Polígono Basarte, 2  
20720 - Azkoitia (Guipúzcoa)  
Spain  
Tel: 943851221  
Web site: [www.juaristi.com](http://www.juaristi.com)

**Responsible:** Aitor Iturzaeta

**Company:** Precision Tool Manufacturer



**Initial Situation:** JUARISTI knew about vibrating treatment for years and subcontracted this work to companies that machined parts for them but a huge volume of orders made JUARISTI decide to buy their own machine. They needed to stabilize the workpieces before being machined.

**Challenge:** JUARISTI mistakenly thought the F62 machine was complex to use so felt the subcontracted service was simpler. The large volume of pieces requiring stabilization caused them to overspend on contracting out services for stabilized vibrating.

**Solution:** Following a demonstration by Metronic in JUARISTI's facilities, they bought a Formula 62 machine. Training was given to operatives who were to use the machine on different shifts. They were surprised by the ease of handling of the machine. The photo above shows a boring mill head before being machined.

**Conclusion:** JUARISTI has earmarked an area of their plant to work on stabilization. Every piece to be machined is stabilized first. The photo below shows a boring mill table during stabilization.



## Case Study Macneny, Spain

**Customer:** Macneny  
León  
Spain  
Tel: 987262441

**Responsible:** Javier Calo

**Company:** Manufacturer of machinery for the mining industry



**Initial Situation:** Macneny is a company dedicated exclusively to the manufacture of special machinery for the mining industry. All chassis of the machines which they manufacture must be stabilized. Until 2007 they sent many subsets of pieces to be stabilized with heat treatment. The results were satisfactory in the furnace, but spending on treatment and especially on transport had risen. MACNENY was looking for an effective alternative and found it with F62.

**Challenge:** Many of the work pieces at Macneny must be stabilized for safety reasons and have to meet certain internal standards. Before making a decision whether to chose Formula 62 a test was performed on a workpiece which would be machined after welding. The work was carried out by vibration in less than an hour, and the piece was then machined; the operator did not notice the difference between this piece and an identical piece that was transported and heat treated in the furnace.

**Solution:** With their own F62 machine, Macneny does not have to remove the pieces from its workshop at any time during the production process. They stabilize all types of welded pieces before being machined. Production times have been reduced enormously.

**Conclusion:** Macneny considers the treatment by vibration as an effective alternative to the furnace. It is important to note that they bought their first F62 machine in December 2007; in May 2008 they have 3 F62machines working at full performance.



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## Case Study Mekanikalan Mondragon, Spain

**Customer: Mekanikalan Mondragon S.L.**

Ctra. Villareal - Landa, s / n  
01170 - Legutiano (Alava)  
Spain  
Tel: 945465734  
Web site: [www.mekanikalan.com](http://www.mekanikalan.com)



**Responsible: Mr. Irasuegui**

**Company:** Sub contractor for large machined pieces

**Initial Situation:** Mekanikalan had used vibratory stress relief for a number of years. They had a Metalax machine, but after a few years they had to return the machine to repair the motor and Metalax took two or three months to return the repaired machine. Mekanikalan machined large pieces for Fagor and could not be without a machine to stabilize the pieces. The problems with the motor reappeared after repair and they opted to change to a Formula 62 machine.

**Challenge:** Mekanikalan stabilizes large workpieces from 1 - 50 tons. The challenge for Mekanikalan was to change from the machine which they already knew to the new Formula 62 machine. They had concerns about a possible failure or breakage and the turnaround time of SRE if faced with a repair. They stabilize by vibration everything that is going to be machined. Curiously, Mekanikalan discovered some customer's pieces which were already relieved by heat treatment (oven) gave them problems in machining (perhaps because the treatment in the furnace was not done the correct way).

**Solution:** Mekanikalan received training regarding the use of F62 and were very satisfied at its ease of use and the warranty given. They resolved the problem on the heat stabilized pieces with an extra stabilization by vibration on all suspect pieces.

**Conclusion:** Mekanikalan does not disclose how much they save in transportation and heat treatments, but they used to spend about \$ 150,000 a year. This figure would have increased in recent years if they did not have the F62 machine. In addition, Mekanikalan offers on-site stabilizing services to its customers; transporting the machine to the customer's workshop and providing the treatment.

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## Case Study Mikra, Spain

**Customer: Mikra Recubrimientos**

Pol. Ind. 10, 29-R  
20200 - Beasain - (Guipúzcoa)  
Spain  
Tel: 943884982  
Web site: [www.mikra.es](http://www.mikra.es)

**Responsible:** Mr. Mikel

**Company:** Metal Coatings – Engine Covers

**Initial Situation:** Mikra is a modern service company specializing in blasting, galvanizing and painting workpieces for a diverse clientele. All of their customers requested that after the blasting, the workpieces were delivered stabilized. Mikra had to send large pieces out daily for heat treatment.

**Challenge:** They needed an alternative to the furnace due to the high costs of shipping and treatment. Also, they had many pieces which because of their large size, could not go into the geographically closest furnaces.

**Solution:** Mikra bought a Formula 62 machine for stabilizing the larger pieces. Gradually they are eliminating heat treatment and replacing it with vibration, and now use the F62 machine on all types and sizes of pieces.

**Conclusion:** The F62 machine has provided Mikra with a very effective alternative to heat treatment. Also, Mikra includes the treatment by vibration for new customers who require it as part of their service. The portability of the machine makes it easy to transport to the customer's workshop and perform the stabilization on site.





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## Case Study Rassini Frenos, Mexico

**Customer: Rassini Frenos S.A. de C.V.**

Carretera Moyotzingo Km. 2.5  
Col. San Gaspar  
San Martín Texmelucan 74179  
Mexico  
Tel: +52 248 482 8200  
Fax : +52 248 482 8214  
Web site: [www.sanluisrassini.com](http://www.sanluisrassini.com)

**Responsible:** Jesus Ruiz

**Company:** Automobile Aftermarket Parts Manufacturer

**Initial Situation:** Prior to the use of Formula 62 the brake drums were “stress relieved” by storing them for two to four weeks after casting. The exposure of the brake drums to the environment while in storage was a requirement in order to allow the castings to settle and thereby be easier to machine.

**Challenge:** The two to four week requirement was not only time consuming but also problematic as it interfered with the production of rush orders. Furthermore, if the brake drums weren't allowed the necessary time in storage the machine process was far more difficult and costly as the replacement of cutting tips during machining was required.

**Solution:** Using Formula 62 the brake drums are stress relieved in 30 minute increments at 200 units for each 30 minute period. After using Formula 62 the brake drums are much easier to machine and inventory is much easier to control.

**Specifics:**

- a. Carbon steel 1080 and 1060
- b. 200 units at 30 minutes for each set.
- c. The drums are used for Nissan Pick-Up trucks.



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## Case Study Tatoma, Spain

**Customer:** Grupo Tatoma S.L.  
Av. Barcelona, 45  
22400 - Monzon (Huesca)  
Spain  
Phone: 974401429  
Web site: [www.grupotatoma.com](http://www.grupotatoma.com)

**Responsible:** Miguel Allué

**Company:** Machinery and Equipment Manufacturing

**Initial Situation:** Tatoma manufactures a wide variety of products. Most are welded structures that have to be machined. Many of these pieces are used for safety purposes, and until now, have been stabilized through heat treatment.

**Challenge:** Tatoma considered the alternative of vibration treatment on these pieces due to the rising cost of transportation to the furnace. In addition, they had cases structures that needed to be stabilized and did not fit in the furnace because of their size. Tatoma unusually received a request for furnace doors. The structures had to be stabilized for two reasons: a relatively high safety factor and also these pieces were to be machined and drilled in several points after welding. They needed to facilitate the work to the operator and maintain the piece within its tolerances.

**Solution:** The furnace doors were stabilized through vibration, and the result was totally satisfactory. The work had major savings for Tatoma compared to transportation costs and heat treatment.

**Conclusion:** Tatoma is fully satisfied with F62. Besides using it on pieces which are welded and then machined, they employ it on pieces which have a high safety factor such as roofs and furnace decks, yokes for casting molten steel (photo below) etc.



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## Case Study Topre, Spain

**Customer:** Topre S.L.  
Pol. Santiga. Workshops 8-N.69  
08210 - Barbera del Valles (Barcelona)  
Spain  
Tel: 937189261  
Web site: [www.topre.es](http://www.topre.es)

**Responsible:** Mr. Valentin

**Company:** Molds for Prefabricated Concrete



**Initial Situation:** Topre has two large areas exclusively dedicated to the manufacturing of molds for concrete prefabrications. The Topre molds are for machines that manufacture concrete blocks. The molds require a lot of welding, and need to be stabilized before delivery to the customer.

**Challenge:** Topre had a challenge: certain workpieces could not be stabilized by heat treatment since the characteristics of the workpiece meant that the oven can not be higher than 300°C. Inside the machine, the mold suffers tears and cracking of the mold from the oven. Topre needed a better stabilization process rather than the one done in the furnace. A test was conducted to see if the life of the mold which was treated by vibration was equal to or greater than that of a mold which was heat treated. The test was a success. Topre was sending out eight molds a day for heat treatment and, despite being smaller pieces (500-800 kg.), the expense on transport and treatment was large.

**Solution:** Topre built an insulating table to use during the stabilization of the molds. Now Topre daily stabilizes ten molds within its own facilities and has eliminated all costs of heat treatment and reduced its leadtimes.

**Conclusion:** Topre are satisfied F62 is a real alternative to heat treatment and has improved the lifespan of their products.

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## Case Study TMO, Brazil

**Customer:** TMO- Cia Olsen de Tratores Agro-Industrial.  
Rua Brasilia, 971 – Caçador – SC - Brazil  
[www.tmo.com.br](http://www.tmo.com.br)

**Responsible:** Nelson Berezanski – Maintenance and Production Supervisor

**Company:** Manufacturer of heavy duty forestry equipment.

**Initial Situation:** Olsen was founded about 60 years ago and is a well established manufacturer of machines and equipment used in forestry management. It has equipment in use throughout the Americas, Africa and Europe. Despite their manufacturing expertise, time after time their equipment develops cracks when in use onsite.



**Challenge:** One of the most frequent areas to suffer cracks is the arm hanger of the trunk loader. The cracks appear near the welded reinforcements, where huge force is applied by the hydraulic cylinder. Many different processes were applied to try to prevent these cracks, without success.

**Solution:** A definitive solution was found using Formula 62 vibratory stress relieving treatment. The Formula 62 method was applied on the previously welded body arm which weighed approximately 850 kgs. The arm was placed on two large truck tires to keep the workpiece isolated and it worked perfectly.



The Formula 62 vibrator motor was bolted onto a piece of steel sheeting which was then secured with a few welded nuts to the arm near the area where cracks usually appeared. Operators were taught how to operate Formula 62 and after two explanations and demonstrations they were able to fully operate the equipment in both manual and automatic mode.

**Conclusion:** The application of Formula 62 is now part of the company's production process for all manufactured arms and base columns. The automatic mode is applied once daily on the workpiece and the manual mode is applied as a final process.

The number of cracks was reduced by 50% which has cut maintenance under warranty costs by approximately US\$75.000. It has enhanced TMO's reputation in the market, enabling end users to recognize that its products are reliable and helped maintain the company's leading market share.

Related by Eng. Arnaldo Marinaro, Energyarc Industrial Ltd., Sao Paulo, SP, Brazil, [www.energyarc.com.br](http://www.energyarc.com.br); Jul/2010.

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Form: SRE/CS/TMO BR280710

## Case Study Joscil, Brazil

**Customer:** Joscil Equipamentos para Cereais Ltda

Rua Herbert Schmidt, 29 – Centro

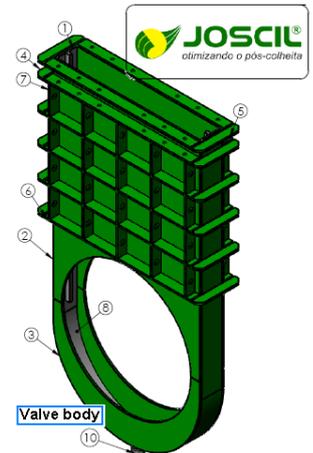
CEP: 98290-000 – Condor – RS – Brazil.

[www.joscil.com.br](http://www.joscil.com.br)

**Responsible:** Mr. Hebert (Industrial Manager)

**Company:** Manufacturer of welded equipment for overhead cranes and other equipment for hydroelectric power plants.

**Initial Situation:** Joscil manufactures valve bodies for hydroelectric plants and other equipment for medium size overhead cranes. All the pieces are manufactured from steel sheets and carry a large number of welded reinforcement plates. Under production these plates are subject to misalignment and distortion and must be treated to prevent valve operation jams and other operational malfunctions.



**Challenge:** Heat treatment is traditionally recommended for these types of workpieces, but heat treating creates additional problems and production delays from time lost moving the pieces to a third-party provider for heat treatment, additional time needed for surface cleaning and a lack of control over the distortion. These problems caused Joscil to look for alternative methods of stress relieving treatment.

**Solution:** Joscil found Formula 62 to be their ideal choice. To treat the workpiece using Formula 62 the body is placed on its side on three tires and the vibrator unit is firmly fixed to the middle. Manual mode is used, as it is easy to find the resonant frequency of the piece. The first time that the Formula 62 vibratory method was applied, an accelerometer was placed at various points on the workpiece to confirm that the resonance point was reached. The results confirmed that the treatment was satisfactory. The piece is treated for up to 8 minutes, which is sufficient for a 500kg workpiece according to the Formula 62 manual. After machining and finishing the workpiece, a final inspection is made to check specifications and test the movement of inner assembled parts.



**Conclusion:** Joscil is satisfied with Formula 62. It has cut their heat treatment expenses by **USD\$ 30,000** to date, and shortened production time by 20 days, allowing them to maintain a profitable contract with the hydroelectric plant.

Related by Eng. Arnaldo Marinaro, Energyarc Industrial Ltd., Sao Paulo, SP, Brazil, [www.energyarc.com.br](http://www.energyarc.com.br); Jun/2010.

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# Case Study: Schuler, Brazil

**Customer:** Prensas Schuler SA.  
Av. Fagundes Filho,  
Diadema, Sao Paulo, Brazil  
[www.schuler.com.br](http://www.schuler.com.br)

**Responsible:** Eng. Fernando Zimmerman – Welding Manager

**Company:** Schuler is a major manufacturer of hydraulic & stamp presses for the automotive industry worldwide.



Stress relieving was done with FORMULA 62 on a new stamp press plate of 36MTons after the customer had requested several important modifications to the plate.

The challenge was to bore several wide holes so that scrap sheets could pass through the work piece. However, because there was no additional material for milling the surface of the work piece stress relieving by heat treatment was not an option—a further restriction was the short amount of time available to make modify-

cations.

Around the large bored out holes, it was necessary to weld reinforcement sheets to compensate for the missing material. Unfortunately heat produced by oxigas cutting and welding introduced stress on the work piece which needed to be relieved to avoid fatigue and misalignment during final production. After a through study the engineers concluded that the best way to stress relieving the work piece was to use FORMULA 62 to apply the correct mechanical vibrations at resonant frequency in order to protect the work piece against fatigue.



The work piece was 6 meters long and weighed roughly 36 MTons, FORMULA 62 was used at resonance frequency for about 45 minutes. This process was repeated three times on the work piece with the vibratory motor positioned 2 meters apart from each side and once again in the middle.

Once the plate was returned to customer it was immediately put into production under pressure. It was inspected periodically for fatigue and after one year it was inspected thoroughly. The final conclusion was that no cracks or loose alignment were observed. FORMULA 62 had solved the issue.

Schuler and its customer are happy with FORMULA 62 and they are especially pleased to have saved **US\$150,000**.



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## Case Study Hidrotam, Turkey

**Customer:** Hidrotam Hidrolik Pnomatik Makina San. Tic. Ltd.  
Meclis Mah. Ahmet Taner Kislalı Cad. Gök Sok. No: 1/A Sancaktepe  
Istanbul – Turkey  
+90 (216) 621 61 06  
[www.hidrotam.com.tr](http://www.hidrotam.com.tr)

**Responsible:** Aysan DALKILIÇ (Chairwoman)

**Field of Activity:** Custom Manufacturing of PLC (Programmable Logic Controller) controlled production lines, machines, apparatus, and supports

### Initial Situation

Hidrotam, is a company which uses advanced engineering methods and designs in their products such as PLC controlled production lines for appliance industries and leading end user companies such as Arçelik in Istanbul/Turkey. Their customers have special requirements for dimensional and geometrical tolerances so Hidrotam is required to manufacture high precision products.

The photograph on left, shows one of their product part's back view, 2,5m width, 1,9m height, S235JR steel sheets heavily welded, thickness is 60mm. The photograph on right shows this part's production display; square blanks had geometric and dimensional tolerances.



## **Challenge**

Hidrotam was struggling with residual stress generated by welding. Wasting time to distortions and wrapping were daily routine. They started using heat treatment but this process is very expensive in the Turkish market. Also they were challenged with customer's precise production objectives.

## **Solution**

Hidrotam purchased Formula-62 in 2015 from Turkish Distributor of SRE equipment, Hancioglu Engineering. Hancioglu Engineering demonstrated the machine, explaining how it works and trained their technical people to use Formula-62 efficiently. Their challenge of heat treatment costs were over and Hidrotam's customer's precise production objectives were reached. Hidrotam is greatly satisfied in using the Vibratory Stress Relief method of Formula-62.

In 2016, Turkish Distributor of Formula-62, Hancioglu Engineering visited Hidrotam to follow up on the usage experience of Formula-62. They're proudly saying that their customer's satisfaction improved and production costs were dramatically decreased.

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## Case Study Hidromode, Turkey

**Customer:** Hidromode Hidrolik Makine Sanayi Ticaret A.I.  
Hadımköy Mahallesi Mustafa Inan Caddesi No:29 Hadımköy  
Istanbul - Turkey  
+90 (212) 771 29 01  
[www.hidromode.com](http://www.hidromode.com)

**Responsible Person:** Oktay BÜYÜKDEDE (Production Manager)

**Field of Activity:** Hydraulic presses and Hydraulic machines

### Initial Situation

Hidromode is a company manufacturing heavy hydraulic presses and special fabrication hydraulic machines, located in Istanbul for 35 years. The company has select customers because of their heavy industry machines. Hydraulic press fabrication process is based on heavy welding and machining. This process generates a high amount of residual stress on the work piece. Hidromode Company was forced to reduce residual stress on their products due to distortions, dimensional errors and alignment problems and they were using heat treatment to fight residual stress in their production.

In 2012, Hidromode Directors realized that heat treatment costs were %8 of their production costs. They began searching for a different solution to fight residual stress.

On the left picture, one of Hidromode's products: a hydraulic press 3m width, 12m height, 13.000kg weight and made of S235JR Steel heavily welded chassis. In Istanbul only 9 outsourced heat treatment companies have gigantic heat treatment ovens. Hidromode asked for the heat treatment service price to them. The answer was terrifying, operation time was 1 week, transportation cost was \$350 and heat treatment service price was \$3,095.



## **Challenge**

Hidromode was looking for alternative method of dealing with residual stress because of the high costs of heat treatment and downtime.

## **Solution**

In 2012, Hidromode contacted Hancioglu Engineering Company, which is the Turkish Distributor of Formula-62. After a demonstration visit, Hidromode decided to buy Formula-62. Heat Treatment expense was a thing of the past and production down time finished.

In 2016, Turkish distributor made a follow up visit to Hidromode to learn from their Formula-62 experience over the past 4 years. Hidromode was truly satisfied with using Formula-62.

According to Production Manager Mr. Oktay BUYUKDEDE the company saved 18 times the cost of buying formula-62 compared to heat treatment in 4 years. "This is perfect for us to improve our competitiveness in Turkish and Global markets by decreasing production costs. Thanks to Formula-62"

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## Case Study Dürr Equipamentos Ltda, Brazil

**Customer: Dürr Equipamentos Ltda**

R. Arnaldo Magniccaro, 500  
São Paulo, SP. Brazil CEP: 04691-903  
Tel: +55 11 5633-3500

**Responsible:** Mr. Jorge A. Castro – Manufacturing Supervisor

**Company:** The Dürr Group is a leading supplier of complete systems for final automobile assembly. They have a wide product range which enables them to deliver 70% of all the equipment needed for final assembly. They also provide engineering services for the automotive industry including factory design, such as final assembly lines, testing centers and infrastructure.



**Challenge:** The Dürr Service Center Department supplies complete support for the Daimler-Benz plant in Juiz de Fora, Brazil. Their assembly line consists of 116 skids. The skids, which carry the car frame along the paint line, were modified and welded. The stress on the frame from these procedures required stress relieving according to Daimler-Benz's specification. These skids cannot be distorted otherwise the vehicle frame doesn't align correctly and the assembly line halts. The stress relief was completed by sub-contracted companies but it was not only very time-consuming but also expensive.

**Solution:** Dürr decided to buy a Formula 62 machine to shorten the time needed to perform the stress relieving process. The Formula 62 machine was applied at several points during the manufacturing of the skids. For example, during the welding of the skid structure then again after the skids were measured and bolted over a table which adjusting specific alignment bolts. In addition, by owning their own Formula 62 machine, Dürr is able to utilize the machine in other automotive plants where immediate stress relieving with short delivery times is mandatory.

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# Case Study CNH, Brazil

**Customer:** CNH Latino America SA  
Av. Gen. David Sarnoff, 2237  
Contagem, Minas Gerais  
Brazil  
[www.cnh.com](http://www.cnh.com)

**Responsible:** Ricardo Abib

**Company Profile:** CNH is a leading global manufacturer of agricultural and construction equipment. The manufacturing plant located at Contagem produces crawler excavators, tractor loader backhoes, crawler dozers and wheel loaders. The CNH group owns the Case, New Holland and Kobelco brands.



This case study illustrates how the use of FORMULA 62 relieves the stress of the chassis pivoting support joint on a CASE machine grader.

**Challenge:** Due to high levels of pressure on the pivoting support during machining there were often cracks detected on the welding bead after the pivot was put into service. This resulted in warranty issues and serious problems because of the work stoppage required to go on-site and repair the joint. The combination of customer disappointment and the high warranty repair cost for CASE demanded a unique solution.

**Solution:** After studying this problem thoroughly CNH engineers concluded that to prevent cracking after welding they needed to stress relieve the work piece using FORMULA 62. As a result all pivoting supports are now stress relieved after welding is complete thus preventing cracks and warranty issues. For this reason FORMULA 62 has been full integrated into their production line.

The new production process requires that immediately after pivot work pieces are welded they be placed on a vibration table connected to Formula 62 for 6 minutes at resonant frequency to resolve any future cracking issues.

CNH has calculated that they're saving **US\$200,000 per year** and they consider FORMULA 62 an indispensable tool. After integrating Formula 62 into their production line they now have a fast, clean, and low cost treatment to a very serious problem.

