WIAP® MEMV®

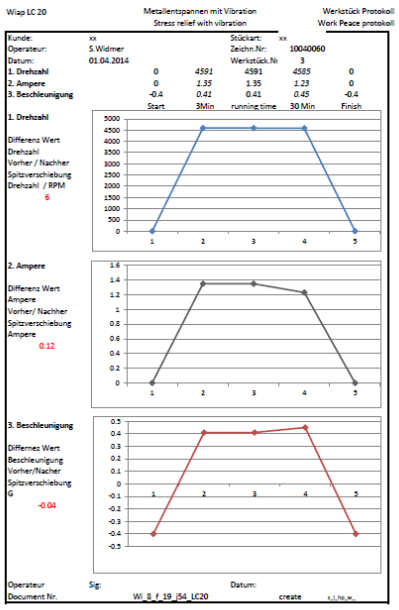
Metal relax with vibration

WIAP investigation report WM 826

Metal relax with vibration. MEMV vibration Relax

Sven, Iris & Hans-Peter Widmer 04.04.2014

Photo: 02/04/2014 Switzerland



WIAP Manual Protocol

Metal relax with vibration MEMV 2014 Vibration Relax

We have in the components, especially in welded structures, big tension, compression, bending and torsion forces, especially in the transition zones of welds. Welded components which in various weld zones were glowing with high, according to literature partially to 3000 degree temperature and then allowed to cool. On the one hand is pressed, in turn, pulls, bends it over. This means that the whole cooling process obtains in certain areas to move the steel in multiple axial directions?

With the vibration relaxation in the cooled or still warm. When evenly the whole component is controlled on good rubber pads and the vibrator is perfectly secured with great force to the component that brings component in motion, then the different voltage offset distributed around the spanungsbelastete zone. The*yield*is the collective term for that the voltage at which employs a plastic (permanent) deformation. If it is a tensile stress, it is called yield stress, a compressive stress, we spoke earlier of yield point bending, it is called yield strength, twisting it is called of twist.
These zones, which are in the cooled state in the cross near the pressure or tensile load, just briefly by means of the vibration exceed the 0.1 proof stress. D. h. by microscopic residual stresses in the vicinity of the cyclic 0.1-proof stress must be at least reached and the macroscopic (and microscopic) internal stresses are effectively reduced.

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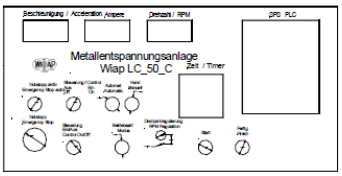
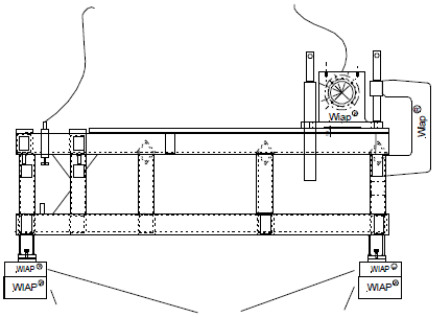
Prozessablaufbeschreibung

Metall entspannen mit Vibration MEMV



4 Messondenkabel

7 Vibrator Motor Kabel



1 Stück Gummi 120 x 100 x 200
alternativ
2 Stück Gummi 120 x 100 x 200

3 Stück Gummi 80 x 100 x 200
alternativ
4 Stück Gummi 80 x 100 x 200

2 Stück Gummi 120 x 100 x 200

Hinweise

A Bitte nicht entspannen in unterkellerten Räumlichkeiten. Immer genügend Gummi Unterlagen verwenden, damit es keine Vibrationen in das Gebäude überträgt.

B Labile und leichte Konstruktionen entspannen wir nicht auf der Eigenresonanz Drehzahl, weil sich das Werkstück zu stark bewegt.

C Entspannen auf dem Eigenresonanz Punkt benötigt eine permanente, aufmerksame Kontrolle. Dies, weil der Punkt immer wieder wegwandert. In der Regel in den ersten 10 Minuten sehr schnel

D Bei bereits Spannungsarm geglühten Werkstücke, die noch mit Vibration entspannt werden, wandert der Eigenresonanz Punkt praktisch nicht. Auch die Ampére verändern sich nur minimal.

Beschreibung Prozessablauf

1	Das Werkstück auf 3 oder 4 Gummiunterlagen stellen. Falls möglich, auf 3 Stück. Es ist besse für den Vibrationsprozess und für die Anzeige Protokollierung
2	Den Vibrator mit schweren, robusten Schraubzwingen am Werkstück festklemmen. Seitlich, nicht in der Mitte. Die robusten Schraubzwingen sehr gut festziehen
3	Das Steuergerät neben das Werkstück stellen und darauf achten, dass kein Durchgan zwischen Werkstück und Steuergerät existiert. Ansonsten besteht die Gefahr, dass ein Mitarbeite über ein Kabel stolpert.
4	Die Messonde auf der anderen Seite des Werkstückes befestigen. Genügend entfern vom Vibrator. Vorsicht, das dünne Kabel, daher kein Durchgang zwischen Sonde un Steuergerät
5	Am Vibrator die Exzenterstufe einstellen. (Erfahrungswerte) Bei schweren, robusten Konstruktion 50% und mehr einstellen. Bei leichten dünnwandigen Teile.: 10 und 25%. Einstellen mit 2 Stk. 6 mm Inbusschlüssel.
6	Die Drehzahl am Steuergerät auf 0 stellen.
7	Anschliessen an Netzspannung 220 Volt 10/ 16 Amp. Die Uhr auf 30 Minuten einstellen. Das Kabel vom Vibrator Motor an Steuergerät anschliessen
8	Den Vibrator am Steuergerät starten. Die PLC Steuerung zeigt eine Bedienerführung
9	Die Drehzahl langsam auf etwa 3500 Umdrehungen drehen. Beobachten der Werte von Ampere und Beschleunigung. Ideal ist, wenn der G Wert minimum 4 G ist. Besser bis 6 G bis max. 50 (
10	Schwere Konstruktionen können problemlos hochgedreht werden bis auf 6000 Umdrehungen Einer der Eigenresonanzbereiche ist bei 3300 U/min bis 4000 U/min und der andere zwischen 5400 und 6000 U/min.
11	Wenn der G Wert nicht erreicht wird, den Excenter noch einmal nachstellen. In der Regel hat ein erfahrener Vibrationsentspanner das im Griff.
12	Nach den ersten 3 Minuten sollte bei der manuelle Anlage der angezeigte Wert abgelesen und im Protokoll eingetragen werden. Nach 25 Minuten, kurz vor Schluss, den Wert wieder ablesen und eintragen
13	Wird mit dem Datenkommunikationsgerät gearbeitet, gibt es eine separate Anleitung
14	Ende des Entspannungsprozesses mit Vibration

gezeichnet:	HPW	Datum:	19.1.2013			translate/en_ds/p_ct/vn_ro	origin: WIAP
Aenderung:	Controll iw	Datum:	20_01_2013	WIAP International	MEMV	Revision	Wi_8_f_
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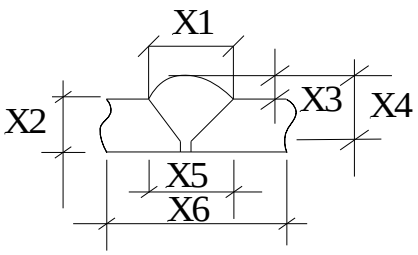
The easiest way is to recognize: The natural resonance moves automatically to another speed range, that is in a lower or higher range. that the Hertz / speed must be readjusted when slightly relaxed during the process under the self resonance it may be. For components without stress this point does not migrate. With voltages that's hike most in the first 10 minutes. The Ampere hike. To begin with a strained component required by the vibrator motor more amperes. That is, the ampere always reduced by about 10 to 17%. The acceleration measuring probe, which measures the G. (1**g = 9,81m / s**^{2}) Note: The WIAP metal expansion plant has a preloaded wave, similar to a machine tool spindle.

Many zones of a component consisting of a welded construction, the are in all environments of the weld seams of the welding locations by the tension of the yield strength. With the uniform vibration this many parts of the welded structure are adjoining the 0.1% yield strength is exceeded prior to the vibration, and thereby prevents a workpiece moves away later dimensionally by the transport or mechanical processing. This measure is sufficient majority. Stress annealing can be spared if the purpose of relaxation of the component is only delay prevention.

<u>So we see the explanation of why the vibration Relax has a benefit. And why customers say it is, even though they do not know why!</u>

An attempt was made to measure welds with various measuring methods. It was examined whether these changes, hardness tests, etc. It is not only the welds, but the transitions between the weld and the component. These zones are excited with the vibration.

A welded structure has zones that are different. The different partial heat can do many things.



What happens if X1 / X4 warms up and the heat conduction flows away when X2 is different? What happens when contracts X5? What infuence has to X6? The vibration relax solves the problem in the edge zones outside the welding seam. Also, the zones in the weld cools during the cooling process which entfernungsabhhänig different, thus also reacts differently. Many of these zones are minimal under the 0.1% proof stress before the cyclic metal relax with vibration.

A cold rolling skin has a very tough resistance that we can not move away with vibration, why? (We have not investigated whether other experiences there in the matter, perhaps we did something wrong.) The cold rolling skin is removed by the recrystallization annealing /treated without causing however an α-γ transformation of the crystal lattice. With a reduction ratio of 5 - 15% (critical deformation degree) due to the low bacterial count a coarse grain is produced. Here is a normalization of the component is more recommended.the degree of deformation is more than 20%, the desired fine grain produced, The recrystallization annealing is used to fine grit, well above the critical deformation of cold-formed parts and takes place just below the A1 temperature:

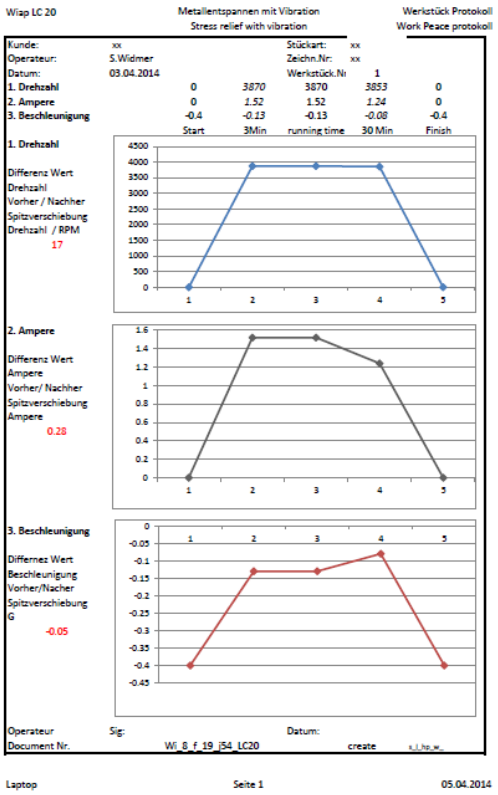
- for thin parts to 700 ° C (but under A1) for about 10 minutes
- with thicker parts at 600-650 ° C over an hour.

High temperatures are dangerous when degrees of deformation are present around the critical deformation degree, as this may cause in secondary recrystallization rapid grain growth. Here the cold-drawn material we had no success, relax with the vibration.

The vibration relaxation takes on a secondary task of the stress-relief annealing, because the stress relief annealing is done with the purpose in the component to reduce internal stresses. It is usually carried out in steel in a temperature range of 450 to 650 ° C, the material starts to flow in accordance with the voltages plastically.

The vibration relax resembles the locations of the train, and pressure-loaded zones so that by the vibration of the train and pressure limit when it exceeds the 0.1% yield strength of the cyclic stresses in the component at the sufficiently reached by the vibration zones reduced resp. Will get removed. In the zones where the yield strength is already touched. This vibration treatment is sufficient for many applications. Because it is desirable that a component is no longer discards after processing or wanders away during transport.

Photo 03.04.2014 Switzerland



WIAP Manual Protocol

From reports and customer experiences we heard that components have been addressed mechanically, then went to the stress relieving. these components often have to be readjusted again after annealing. Why? Be in the warm-up process zones more or less different depending on the heat react during heating and thus have to answer for the mass migration?

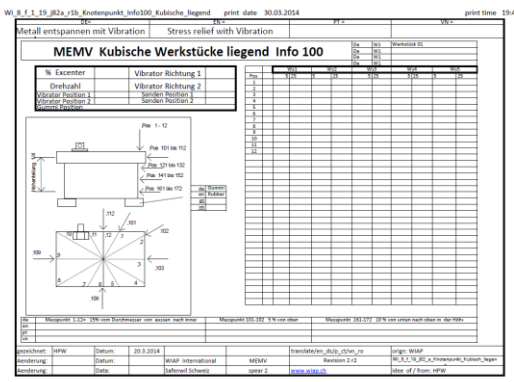
In return, we have studied theses in detail, with a WIAP plant a thesis was written. The student wrote that he annealed, vibrated and unannealed components tested. The annealed component rejected upon ignition. The vibrated has not discarded, but the end result was the same for both of the post. Both had no delay. The Unannealed and not vibrating component had default! This in turn means that vibration Relax has a good additional side effect. It does not reject a component by vibrating. By contrast, a stress relieved component can discard it. If it needs to be readjusted again, the component is re-loaded with new tensions and should be refired, which often does not take place again.

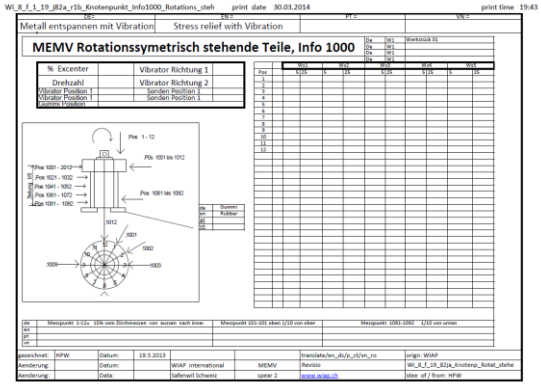
We want to nodes and node document shifts! That is, we may have different component zones. That's a topic for a future investigation reports.

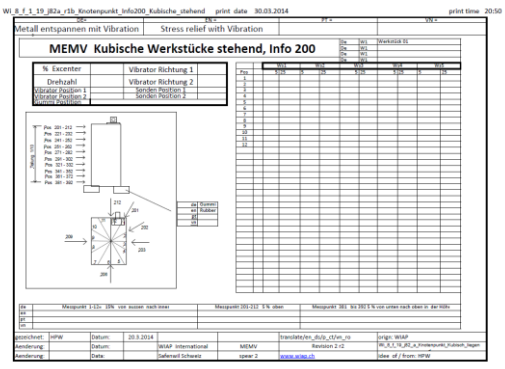
- Below protocol templates .:
- For the node marks
- Position measuring points with G good value measurements and in various places.
- Vibrator attachment site logging
- Rubber backing positions and number

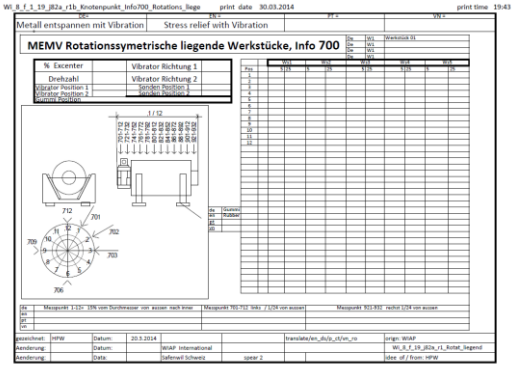
Everything from looking up at the system 0 to 12 PM.

- For cubic and rotation-symmetrical workpieces vertically and horizontally. More templates for other value types of parts are being processed









Accounts point determination Rapport

A few notes and word and sentence elections are out of the Wikipedia and a few sentences from the book: Wärmwirkung of welding in 1988, Dieter Radaj, Springer Verlag, chapter 4.4.3.3.5. Vibration relax.

Best regards / best regards Dulliken Switzerland 04/03/2014

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