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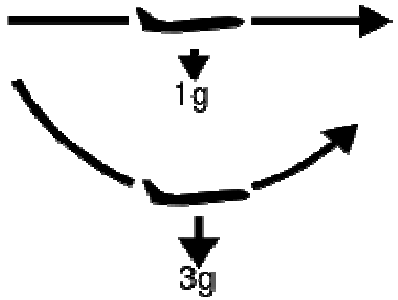
G-force 1/3			

g-force



For example, tripling the g-force
in an aircraft by flight in a
upwardly curved path

g-forces are called stresses that the result of severe changes in size and / or direction
acting speed on the human body, a commodity or a vehicle.
For loads of technical equipment such as aircraft or specifying exposure limits and the term
Load factor used. It is in the g-force is a "force proMasse", so it has the dimension of
Acceleration and is specified as a multiple of the acceleration due to gravity g. High g-forces occur, for example,
when driving with a roller coaster, at missile launch or in collisions of objects on.

Physical basics

A formula 1 racing driver feel at the start of a force that it - contrary to the acceleration direction - rearwards
pressed into his seat. This force arises from the fact that the race car is accelerated forward.
The driver's body would remain because of its inertness to this acceleration, if he does not
would swept through the seat. So what the driver feels is no actual external force him stronger after
back pressed into the seat but its own inertia, which makes itself here in the form of an inertial force felt.
The driver is accelerated by the seat forward.

After the basic equation of the mechanics of the driver's body undergoes (mass m) is the acceleration a = F / m, when a force F acts on it. In this case, the
physical concept acceleration depending on the direction of the force colloquially also mean deceleration or change of direction. The driver is relative to
his vehicle alone. In physics this is called an accelerated frame of reference. For him, there is a balance of power between the accelerating
Force F and the inertial force F *. The inertial force is thus opposite the same size as the external force. Therefore, the acceleration a, is this on the
to quantify mass-based inertial force. Here, the acceleration is then often expressed as a multiple of the acceleration due to gravity g ≈ 9.81 m / s2, because this
"G 1" therefore means that the experienced acceleration is equal to the acceleration of gravity and that, consequently: easy to compare with the everyday experience is
the inertial force is equal to the force of gravity (on earth).

special cases

Uniform linear acceleration

When a body on the distance s is accelerated v from the rest of the speed, is its acceleration:

$$a = \frac{v^2}{2s}$$

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This follows by switching from the path-time and velocity-time laws of uniformly accelerated motion:

$s = \frac{1}{2}at^2$ or. $v = at$

The same formula is obtained for the amount of acceleration in a body on the track s v decelerates to zero (the speed See also Deceleration).

Examples

A car driving at 30 km / h against a solid wall, respecting the crumple zone by 50 cm is compressed. The g-force is 7 g. Already 50 km / h have the g-force nearly 20 g.

A body falls from height of 1 m onto the floor. The more rigid body and base are, the higher the g force. Is the soil is not by and the body deforms by 0.1 mm and then remains lying, it has been braked with an average of 10,000 g

Method WIAP MEMV type A Description: G displacement

The present description explains a method of measuring the residual stress of workpieces during their vibration. When machining workpieces from Metal, for example during welding, stresses arise in the workpiece. These undesirable stresses remain in the workpiece. Also casting Forging or machining operations can cause permanent tensions. These stresses reduce the load capacity of the workpiece and may also have a negative impact, if the workpiece to another, in particular machining is to be subjected. In addition to the impaired dimensional stability may also suffer the subsequent corrosion resistance of the workpiece.

Known and widespread is the relaxation of workpieces by heating or annealing. but this is time-consuming, energy-consuming and expensive. It is also relative to the workpiece not without problems, since both the heating and the cooling can easily change its dimensional stability and the workpiece warping. Flame-related workpieces have locally on a state of tension, which communicates with the environment in balance. will this annealed workpiece is confronted by a new deformation stress state and the workpiece is then bent. Subsequent processing is then do not have a great influence on the straightness. In addition, it forms during annealing scale, which in a further step back from the Workpiece surface must be removed. For example, by sandblasting, which can lead to new tensions in the workpiec

Decades ago, the residual stresses induced in the metal through the processing by shaking or vibration of the workpiece has been proposed again dismantle. For this purpose, the workpiece is vibrated on a vibration table or by means of an attached vibration device or vibrated. Th may be about 5 to 30 minutes. For larger and heavier workpieces also significantly longer vibration times were known, but this mac Avoid various reasons. When vibrating the residual stresses over the entire workpiece are brought into balance, not just in th Surface. The workpiece can be processed further.

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The residual stress relaxation is strongest at the beginning of the vibration, but then the effectiveness levels off quite quickly. This process is often associated with multi
connected unknown and needs some materials and expertise or proper instruction. Although there are numerous compared to the heat relaxatic
has advantages, namely less time and energy consumption, avoidance of the thermal distortion of scale and contamination of the workpiece, the insert i
the vibration stress relieving often spared.

On the basis of these findings, the object is to provide a method of measuring the residual stress of workpieces is that when
can be used vibration relaxing, metal-processing operations is practical and leads to reliable measurement results. Thanks to the process
values obtained with respect to the internal stress of workpieces, can the subsequent relaxation, that is, the voltage reduction and
perform stabilizing the shape of the workpieces more efficient and targeted.

This is especially true for the vibration relaxation. Mainly for testing purposes, this measuring method is also commonly used to detect
Residual stresses can be used, of course even with workpieces that have been relaxed in other ways.
It has been always thought that a workpiece thereby vibrate uniformly, that is, at every point of its surface and its volume approximately equal. by many
Attempts by the present process has been recognized, however, that this is not the case. Actually result in vibration relaxation areas where
the material of the workpiece respond differently to the induced vibration. The G-value, corresponds to 1G = 9.81 m / s² is the same everywhere. rather shifts
and this G-value on the axis of vibration variously changed according to the prevailing there in each case, different residual stresses of
respective workpiece. this is detected accurately by the process, which used to significantly better results by the vibration relaxation relaxation
can be. both the time and the energy consumption can also be reduced through targeted work.

For actual measuring method: at said measuring points 2 - 13, a sensor is respectively set, more specifically, an acceleration sensor. Such
Acceleration sensors are technically known under various names, as accelerometer or G-sensors.

the acceleration is measured. This is done mostly by which is determined on a test mass, here the workpiece 1, acting inertial force. This allows
to measure whether a shift of the G value takes place. Recorded measurement values are called Akzelerogramm. In the present specification
is preferably measured by means of in each case connected to a control device, acceleration sensors simultaneously at all measuring points. But it would be
also possible to manually add a pin-type acceleration sensor successively at these measurement points 2 - to be set 13, which of course no continuous,
takes place through control.

Now the device is switched to the vibration relaxation and thus ramped up the vibration of the workpiece. 1 The vibration is amplified until
the natural resonance of the workpiece 1 is nearly reached. That is, there occurs a probing to the G-value. This is dependent on workpiece due to the dimensional stabili
This G value can be defined in a formed as a solid body work as follows: 1G = 9.81 m / s². The G-value can in this measurement at any of the
various measuring points 2 - are exceeded. 13

Thanks to the measurement in a plurality of measurement axes and multiple accelerometers can be recognized also, where tensions have been reduced and where not.

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