

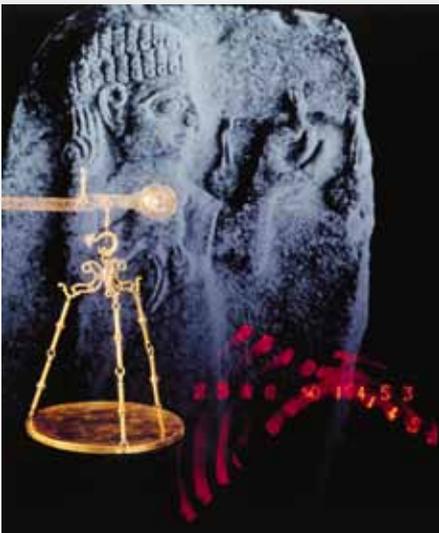
History of scales – Part 1

... Scales and weighing in the course of time ...

By Wolfgang Euler,

Engineer, adviser and consultant for international statutory measuring and calibration systems and scales technology

Weights and measurements are something self-evident for us, because everything at Bizerba revolves around this topic. But when were weighing scales actually invented? Why do we have this measuring device at all? These are only a few of many questions which we will answer in a 4-5 part series on the history of scales.



The origin of weighing scales

How unimaginably vast is time and space. Our earth is at least three and a half billion years old. A grain of dust in the universe circling around the sun, along with the other planets of our solar system. And this sun in turn is only one of about fifty billion fixed stars which fill the Milky Way system.

The beginnings of life likewise lie billions of years in the past. However only two million years ago the so-called „primates“ formed, creatures who walked upright. „Homo sapiens“, the first human beings, still had to develop from them.

The human being is the feeblest and most helpless of all creatures as a newborn infant, with scarcely any physical abilities. But behind the low and bulging brow glows the divine spark of the mind, in his slumbering soul shines the presentiment of a higher mission. And thus the future lord of the earth begins along a path which, with sacrifice and struggle, leads to the enlightened gate of culture and onward to the bright path of history.

The Neanderthals traveled over the world for many millennia. They were hunters and gatherers and lived, as one might say, „from hand to mouth“.

Approximately 10,000 years ago, at some time and somewhere, the first peasants then formed in the early dawn of human history. At other places a band of wandering nomads settled along the shores of a lake and devoted themselves to fishing. And with the changed mode of living, they also created the first successful tools.

Step by step they conquered the plant kingdom, cultivated the first field crops and planted cereals such as barley and einkorn wheat. The origins of the first agricultural cultivations presumably go back to former Mesopotamia.

The humans who had led an existence as hunting and gathering nomads until then eventually became sedentary. And with this significant

jump in development, mankind began to measure for the first time, because people needed to determine the quantity of types of grains and figure out the size of lands, property, and surfaces.

The first measuring implements

Hollow and simple linear rulers are probably the oldest measuring instruments of mankind. Weighing scales, as suspected, come immediately thereafter. Containers of similar size were initially employed for determining quantity, for example a hollowed-out coconut. And a wood stick or forearm helped to determine lengths, distances, surfaces, and goods. This simple but effective method only presupposes that two or more individuals accept the measure. And the ensuing measurements were nevertheless so beneficial that we in part know and employ them to this very day.

- **Bushels:** German measure of capacity for bulk solid bodies (e.g. cereals) used until 1872
- **Yard:** as measure of length
- **Foot:** common in the Anglo-American region then as now
- **Litre:** today our most common measure of capacity



Coconut, foot or wood stick; simple but effective means to measure quantities and lengths

History of scales – Part 1

... Scales and weighing in the course of time ...

„The human is the measure of all things“ – this figure of speech applies also to the development of scales. With arms outstretched to the side, the human torso forms the scales beam and the accompanying weighing pans with his hollowed hands. The barter transactions of original peoples were probably concluded in this way to compare weights.

The origin of the scales – symbol for equality, truth and justice – extends back to the oldest ancient cultures. In the Neolithic period (10,000 B.C.), the first mechanization and cultivation of human life begins. Stone weights (around 7000 B.C) were found in Egypt – historical testimony which speaks for the fact that scales must have existed in this ancient culture.



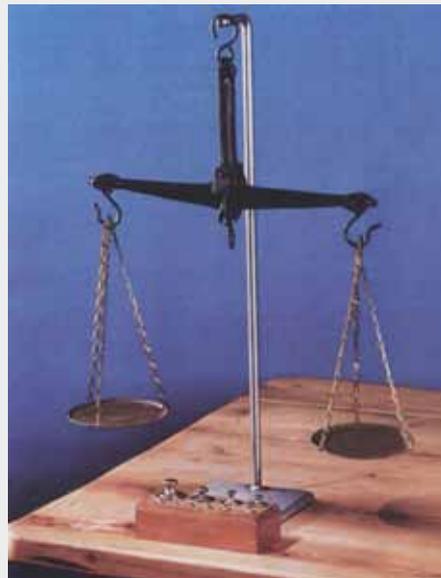
Carrier



Yoke employed by coolies

Around the world today, primarily in Asia, the yoke employed by coolies or the bearing yoke to carry water, milk, cheese, or similar loads employed in many countries soon gave primitive peoples the idea of balancing two loads. The pivoting point of the beam soon migrated from the human shoulder to a stone or wooden column, and for smaller scale beams to a middle bearing eye, and in later times to a middle cutting edge. The

basic form of the equal-armed beam balance was thus invented, probably in different places around the same time. Where precisely scales were developed in ancient times can still not be determined to this day.



Equal-armed beam balance

The oldest conserved equal-armed beam balance was found in a prehistoric tomb in Egypt and is dated at the time around 5,000 B.C. Its scale beam consists of reddish limestone and is pierced in the centre and at both ends, and is furnished with strings which guaranteed free play and great sensitivity. Origins of measuring devices are to be sought especially in lands of the Babylonians between the Euphrates and Tigris (today Iraq) as well as in the valley of the Egyptian Nile. The first known measurement and weight system, which was trend-setting for the metrological* development in antiquity, was located in the ancient Babylonian city of Ur northwest of Basra (Iraq) around 2600 B.C.

* Metrology is the study of weights and measures.

Both Bible and Koran insist on balance. Examples of quotations indicating the importance of scales and units of measure:

Bible, Old Testament:

- Leviticus 19, 35
Do not use dishonest standards when measuring length, weight or quantity.
- Leviticus 19, 36
Use honest scales and honest weights, an honest ephah and an honest hin.

Koran:

- Verse 86, 7th Sure:
Therefore keep measures and weights fair and honest / and do not reduce the property of the people / and do not damage the land once it has healed.

In the next part of this series, we will undertake a „time travel with the equal-armed beam balance through the millennia up to the present“.

About the author of the article:

Mr. Wolfgang Euler is an engineer, adviser and consultant for international statutory measuring and calibration as well as for scales technology, and was the former chairman for automatic scales in the European metrology association CECIP and Group Legal Metrology Manager for Chronos in Hennef. He worked 48 years for this company world-wide in the fields of design, service, training, & legal metrology. Mr. Wolfgang Euler has been in close contact with the technical development of Bizerba GmbH & Co. KG for over 10 years and has kindly declared himself willing to write this series for our Bizerba News. ■