

THE PORTUGUESE *marco* OF 1499 THE FIRST TRAVELLING STANDARD AROUND THE WORLD

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Abstract – In 1499, weights and measures in Portugal were object of a general reform and copies of the national standards of the *marco* were distributed all over the country to the counties. In the same decade the Portuguese Discoveries were in its highest level and the maritime route to India and America discovery are the most well known achievements. But the Portuguese were also the first travelling in the Pacific and arriving to the Moluccas Islands China, Japan and too Australia. Fernão de Magalhães, the first navigator making the circumnavigation around the globe (1519-1522) was a Portuguese although under the Spanish flag. It is now recognized that one of the purposes was to establish new routes for the trade and the vessels were equipped with a copy of the *marco* to be used in trading with other civilizations. This means that it was the first measuring standard to be used and compared with other local standards as there are descriptions of the travels.

Keywords: measuring standard, discoveries, marco

1. INTRODUCTION

The universal acceptance and full use of a single system of units of measurement still is today, in the XXI century, something difficult to foreseen in a next future. After the celebration of the Metre Convention in 1875, Anglo-Saxon units, the large decimal multiples and two different ways of writing decimal numbers still consist in the three major obstacles to achieve that goal. But this effort to use a unique language in metrology already made a long way since the very beginning.

Up to the XV century the measuring standards had a local or limited regional application and acceptance [1]. It was the Portuguese saga of the Discoveries that made a first effort to change this panorama. Two major strategic decisions contributed for this achievement: the decision on the adoption of the *marco* as the national standard for the weight and the decision to go all around the globe to discover new territories, to contact other civilizations and what is relevant for this subject to establish trade agreements with different peoples using weighing instruments and well defined measuring standards.

2. THE PORTUGUESE MEASURING STANDARDS IN THE 15TH CENTURY

In fact the first decision to adopt the *marco* as a national standard was decided by Afonso III in the XIII century and re-adopted by King João II in the Provision of 1488, unifying the value of the local standards all over the country.

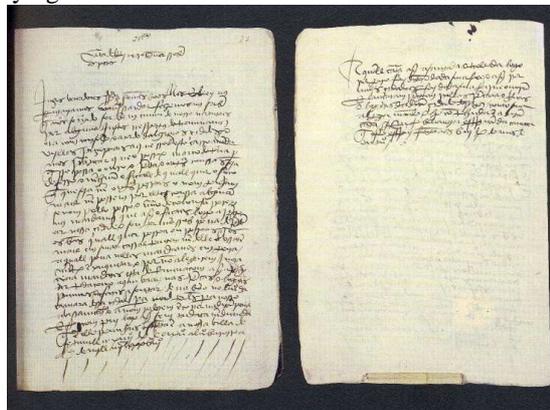


Fig. 1. The Provision of 1488 of King João II.

But really this decision only became effective in 1499 when the following King Manuel I ordered the manufacture of the national standard for the *marco* and the manufacture of copies to be distributed all over the country to each county. This order to manufacture and distribute copies was decisive because the same decision had been taken several times before by other previous Kings but without success, mainly due to the local power and influence of the nobles, the bishops and other masters, interested in cheating weights and measures for a bigger income from the taxes and rents applied to the peoples.

The national standard of 1499 was a set of weights in a pile weighing a total of about 60 kg, with 16 individual weights from about 1 g to 29 kg, the box with all the weights in is also a standard. The original 1499 national standard is kept today in the Metrology Museum of IPQ.



Fig. 2. The *marco* of King Manuel I.

The value of the *marco* was about 229 g and in the following table are the relations and the metric equivalences for some of the submultiples and multiples, as measured recently:

Table 1. The metric equivalence of the *marco* collection

Name	Relation
Escrúpulo	1/3 oitava
Oitava	1/8 onça
Onça	1/8 marco
Marco	229 g
Arrátel	2 marcos
Arroba	32 arráteis
Quintal	4 arrobas

3. THE MAJOR ACHIEVEMENTS OF THE PORTUGUESE DISCOVERIES

The second strategic decision was a royal national mission, taken by successive Kings and adopted with enthusiasm by the Portuguese, to leave their small and poor territory and go all over the world spreading their faith and establishing commercial and cultural relations. It is now almost admitted by all, after documented research work that America, Australia, Japan and other territories and nations were firstly touched by the Portuguese. There are descriptions and maps of these travels and the relations then established with other peoples are the best evidence of this missions and in some cases describe the differences found in other local measurement standards and instruments.

In fact it is now admitted by independent researchers that the Portuguese travelled first than others all around the globe. Mostly are well known of everybody but others that result from recent researches deserve a special reference as: the arrival of Corte Real to Terra Nova in 1471, the fact that Cristovão Colon who discover the Caribbean islands and America in 1492 was Portuguese [2], Cristovão de Mendonça the first arriving to Australia in 1522 [3].

These achievements were not a success by hazard but were the result of clear strategy established many years before in the fourteen century. The plantation of a large forest of pine trees (in the reign of King Dinis, 1261-1325)

after used to supply a shipbuilding industry to built up the fleet, a school to train the captains and masters in the navigation techniques, the development of navigation instruments, a centre on cartography and the centralization in the sphere of the King of the definition, achievements and plans of the discoveries under a strong secrecy. D. Henrique (1394-1460) brother of King João I (1357-1433) was the strategist in this early period and founder of the navigation school of Sagres.

The most important travels that can support this vision in a period of about one hundred years are in the next table

Table 2. Most important travels

Year	Place/Navigator
1419	Madeira Island, João Gonçalves Zarco
1427-1452	Azores Islands, several
1445	Cabo Verde Islands, Dinis Dias
1472	Terra Nova/Canada, Corte Real
1474	S. Tomé Islands (Equator), João de Santarém
1487	Cape/South Africa, Bartolomeu Dias
1492	Cuba, America, Cristóvão Colon
1498	Índia, Vasco da Gama
1500	Brasil, Alvares Cabral
1506	Ceylon, Lourenço de Almeida
1512	Timor, Rui Brito
1514	China, Jorge Álvares
1522	Australia/new Zeland, Cristóvão de Mendonça
1524	California, Rodrigues Cabrilho
1542	Japan, Francisco Zeimoto and others

4. THE RECENT DISCOVER OF A COPY OF THE PORTUGUESE *marco* IN NAMIBIA

In the recent discover of a large Portuguese vessel shrunk in the first part of XVI century at the shore of Namibia, a copy of the national standard of King Manuel I was found intact. The excavations didn't finished yet but this is one of the best proofs one could present of those national commitments. The fleet vessels were provided with a sample of these standards to be used all over the trading acts whatever their destiny and purposes were. The found copy is a regular pile set as can be observed on the following photos.



Fig. 3. The *marco* found in Namibia in the hands of the anthropologist in the exact place of the excavations.



Fig. 4. A detailed view of the *marco* found in Namibia.

5. CONCLUSIONS

Besides the religious purposes of enlarging the faith around the world, supported by kings and popes, the Portuguese had clear economic and commercial intents associated to the Discoveries. Trading goods requires weights and measures and the fleet was equipped with copies of the national standards. In conclusion, the national standard of the Portuguese *marco* was the first travelling standard being used around the world.

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