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Was the flute a vessel designed to evade paying toll in the Sound?¹

The flute was a type of vessel developed in the Netherlands around 1595. In historical literature, the narrow upper part and deck of this vessel was considered to be an adaptation designed to lower the toll that the vessel had to pay at the entrance to the Sound between Denmark and Sweden. The source quoted for this comes from the book on shipbuilding by the Dutchman Nicolaes Witsen, *Aeloude Scheepsbouw en Bestier* from 1671.

Around 1600, the toll levied by Danish officials at the entrance of the Sound was calculated according to the amount of cargo carried. Witsen's remark seems to assume that the width of the deck was used to estimate the carrying capacity. When looking at the practices of the toll officers, it is evident that no measurements were made on board the vessels, instead they trusted the declarations and ship's papers provided by the skippers. It was only in 1632 that the first measurement tables were issued to estimate the carrying capacity of ships.

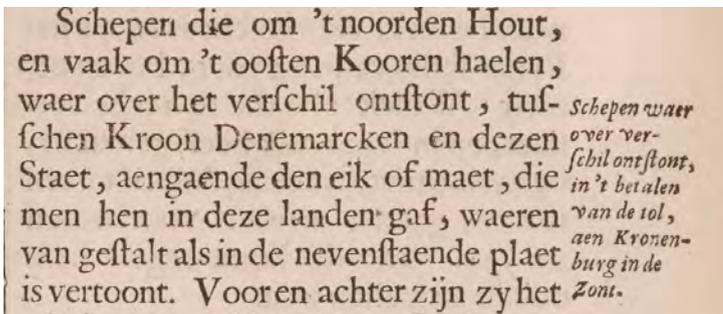
The part of the book by Witsen with the remarks on the Sound Toll concerns in fact the flutes sailing to Norway for timber. The shipmasters in this trade systematically gave lower estimates of the capacity of their vessels in order to lower the toll. The 1632 measurement tables made this fraud difficult. In 1647 new tables of measurement were issued. From then on ships sailing to Norway had to carry certificates stating their size. These 1647 tables did favour vessels with a narrow deck amidships and broader deck fore and aft, giving rise to the construction of a new form of the flute which was significantly narrower amidships than fore and aft and thus could succeed in lowering the toll. After 22 years, in 1669 a new method of measurement made this construction no longer profitable.

Witsen's remark about the Sound toll is therefore not correct, and leads to an incorrect interpretation of the flute by historians.

1 My thanks to Ubo Kooijinga, who raised this question to me, to Jan Willem Veluwenkamp for useful suggestions during the wri-

ting process and to Jeremy Watts and Emma Yandle for improving my English.

The Dutchman Nicolaes Witsen (1641–1717) includes in his book *Aeloude En Hedendaegsche Scheeps-Bouw en Bestier* [Ancient and Modern Shipbuilding and Management] a section on “Noorts-vaerders Maet” [North-sailing (vessels) size/measures], which discusses the dimensions of the kind of fluteships that primarily sailed to Norway.² He specifically describes the Noorts-vaerder as a ship that could be used to deceive the Danish toll-officers and reduce the amount of toll due. According to him, the loading-capacity of the ship was calculated on the basis of the width of its deck, whereas the design of the flute enabled more goods to be stowed in the ship than this measure would imply.³ In the margin of the main text, Witsen includes a note in which he states that these vessels sparked a conflict on the payment of toll in the Danish Sound.⁴



The marginal note in Nicolaes Witsen's book on shipbuilding *Aeloude en Hedendaegsche Scheeps-Bouw en Bestier*, 1671. AMSTERDAM, HET SCHEEPVAARTMUSEUM.

This marginal comment seems to be the origin of the widespread consensus amongst scholars that a flute sailing through the Sound would be able to evade paying part of the toll that was levied there. Karl-Frederich von Olechnowitz⁵, Jules van Beylen⁶, Richard W. Unger⁷ and A. Wegener Sleeswyk⁸ are

2 Nicolaes Witsen, *Aeloude en Hedendaegsche Scheeps-Bouw en Bestier* (Amsterdam 1671) 160–61.

3 Ibidem, 160: “Voor en achter zijn zy het wijtst, in de midden 't naeust, daer zy anderzins het wijtste zijn ... om by maet den inhoud te verkleinen, Het uitbreecken dezer Schepen voor en achter, bracht hier in den Schipper profijt aen, datze veele goederen meer stouden, als de maat der Schepen hielt. Dog dit winst vinden heden is te niet gedaen, door een andere wijs van meten, (...)” [Before and aft they [=North sailing vessels] are the widest, in the middle the narrowest where normally they are the widest. ... The widening of these ships fore and aft, was advantageous for the skipper as the could carry substantially more goods as

the measurement [=for toll dues] allowed. This advantage is now offset because of a different way of measuring].

4 Ibidem: “Scheepen waer over verschil ontfont, in 't betalen van de tol, aen Kronenburg in de Zont” [The ships about which the dispute arose on the payment of the toll due at Kronenburg in the Sound].

5 Karl-Friedrich von Olechnowitz, *Der Schiffbau der Hansischen Spätzeit* (Weimar 1960) 13, sees toll-evasion as the reason why the flute was built with its pear-shaped hull. He assumes, without documentation, that since 1577 the loading capacity of a ship had been calculated by taking the length of the ship and multiplying it by the width and height of the hull amidships. “Die geschäftstüchtigen

among those who have upheld this viewpoint in the last half a century or so. Recent examples include a review from 2005⁹ an article in the year book of Het Scheepvaartmuseum in Amsterdam of the same year¹⁰, a short article dated 28 March 2011 on the website of Het Scheepvaartmuseum¹¹, and a master's thesis from the University of Southern Denmark also of the same year.¹²

There are reasons to doubt the validity of this rich historiographical tradition. These reasons concern the different tolls that were levied in the Sound and the ways in which they were determined by the Danish authorities. The sort of toll that would have been reduced by the design of this flute was the so-called ship's toll (*skibstold*). The ship's toll, in the way it was levied from around 1500,

holländischen Kaufleute und Schiffer erkannten selbsverständlich sehr bald die Möglichkeit, den Zoll zu hintergehen, indem sie das Deck, (...) ausserordentlich, ja geradezu grotesk schmal machten." [It goes without saying that the commercially astute Dutch merchants and skippers recognized very soon the possibility to reduce the toll (...) by making the deck extraordinary, even grotesquely narrow].

6 Jules van Beylen, *Schepen van de Nederlanden, van de late middeleeuwen tot het einde van de 17e eeuw* (Amsterdam 1970) 107: "Deze vorm was bijzonder voordelig bij de scheepsmeting welke verricht werd voor de betaling van de Sonttol aan de Deense koning" [This form was particularly advantageous for the measurement of ships, executed for the payment of the Sound toll dues to the Danish King].

7 Richard W. Unger, *Dutch Shipbuilding before 1800, Ships and Gilds* (Assen/Amsterdam 1978) 46, describes the flutes' toll-evasion due to its form as "fraud". Cf. Same author, "The Fluit: Specialist Cargo Vessels 1500 to 1650" in: Robert Gardiner ed., *Cogs, Caravels and Galleons, The Sailing Ship 1000-1650* (London 1994) 126: "The relatively narrow decks were to make working the ship easier, but also to decrease the toll charges that Baltic traders had to pay to the agents of the King of Denmark on their way through the Sound." In email correspondence with this author in Spring of 2017, Unger agrees "that there were other reasons for the success of the fluyt, more important than the toll saving."

8 André Wegener Sleswyk, *De Gouden Eeuw van het fluitschip* (Franeker 2003) 18: "Volgens de overlevering was de rompvorm van het fluitschip bedacht van de sluwe Nederlandse kooplied van omstreeks 1600 met het

doel de tol de ontduiken die werd geheven voor de doorvaart door de Sont, (...)" [According to tradition, the hull of the flute ship was conceived by the cunning Dutch merchants of around 1600 with the aim of evading the toll that was levied for passage through the Sound, ...].

9 J. P. Sigmond, Recensie van A. Wegener Sleswyk, *De Gouden Eeuw van het fluitschip* in: *Low Countries Historical Review* 120:4 (2005) 620: "De meest bekende [factor] is wel dat de vorm van de fluit het mogelijk maakte de Sonttol te ontduiken dan wel te verminderen" [The best known [factor] is that the shape of the flute made it possible to evade or reduce the Sound toll dues].

10 Diederick Wildeman, 'Fluit' in: Rammelt Daalder and Elisabeth Spits, eds., *Schepen van de Gouden Eeuw, Jaarboek 2005*, Vereniging Nederlandsch Historisch Scheepvaart Museum, Stichting Nederland Scheepvaarmuseum Amsterdam (Zutphen 2005) 75-82, see 77f.

11 www.hetscheepvaartmuseum.nl/collectie/artikelen/701/het-fluitschip-vrachtschip-uit-de-gouden-eeuw: "Het smalle dek van de fluit was voordelig bij de tol bij kasteel Kronborg aan de Sont: het schip kon door het grote buikige ruim veel laden, terwijl de tolheffing gebaseerd was op de breedte van het dek" [The narrow deck of the flute was advantageous at the toll at the Kronborg Castle on the Sound: the ship could take in a lot of cargo because of the large, round-bellied hold, while the toll was based on the width of the deck].

12 Konstantinos Alexiou, *Two 16th century ships: their hull form and performance* www.maritimearchaeology.dk/downloads/MA_Thesis_Alexiou.pdf. 48. Alexiou builds on Unger, 'The Fluit', 126. Cf. Note 7.

depended on the size of the ship and whether the ship sailed loaded or in ballast. The tariff differed for ships sailing in ballast under and over 100 lasts.¹³ For loaded ships, it differed for those under 30 lasts, from 30–100 lasts and over 100 lasts. The dividing line between under and over 100 lasts is of particular interest as the flute used for transport to and from the Baltic from around 1595 – the Ooster-vaerder [East-sailing vessels]- had a loading-capacity of roughly this size. Ships assessed to be over 100 lasts paid 1 rosenobel and ½ daler more than ships under 100 lasts.

Buoy and clerk money (*tønde- og skriverpenge*), also levied according to the size of the ship, is not relevant here, as the dividing line was at 30 lasts, with the toll paid amounting to 12 or 16 skillings respectively. This was insignificant compared to the toll paid for the cargo.

All other types of toll were levied according to the recorded quantities of the commodities on board – last-toll and beacon-money (*lastpenge & fyrpenge*) – or their documented value – the thirtieth penny (*tredivte penge*) – rather on than the carrying capacity of the ship. In addition, there was a fixed salt-toll of 6 barrels, for which the toll officers gave a minor compensation. All these tolls can be used to assess the loading-capacity of a ship.

It is worth noting that the mariners' portage (*føring*, Dutch: *voering*), i.e. the amount of goods a shipmaster and his crew were allowed to carry free of toll (between 5–10 lasts depending on the number of crew members), would increase the assessment of the size of a ship. For example, a ship with a documented cargo of 95 lasts would then be considered to be over 100 lasts.¹⁴

All of this implies that we have to look into the ship's toll and the distinction made between under and over 100 lasts, as well as into the way the toll-officers calculated the size of a ship in lasts. To the best of my knowledge, no one has so far taken the trouble to look into the Sound Toll Registers and check whether they provide evidence that the toll-officers were in fact as easily deceived by the clever design of certain types of ships as scholars have presumed. This paper will examine the toll registers to this end. But before we investigate, we should take a closer look at the flute itself.

13 In terms of grain, a Dutch last would weigh ca. 2 tons, but this often differed from one country to another or even from one city to another. For example, one Dutch last was 7/8 of a last in Lübeck, and only 3/4 of a last in Stralsund. A conversion table used at the toll-office in Elsinore can be found at the Sound Toll Registers Online, roll 073 scan 21

<http://dietrich.soundtoll.nl/scans/toon.php?fnr=073&sid=21> (Sound Toll Register Online (STRO), STRO 073_021). A last could also be measured by volume instead of by weight, depending on the commodity.

14 Louis E. Grandjean, ed., *Frederik II's Søret, et erhvervshistorisk Kulturbillede fra 1561* (Copenhagen 1946), Cap. X.



A flute sailing in open water, painting by Jeronymus van Diest, c. 1660. AMSTERDAM, HET SCHEEPVAART-MUSEUM.

THE FLUTE

The first flute was allegedly built in Hoorn, in the Netherlands in 1595, by Pieter Jansz. Liorne.¹⁵ It is quite clear that it was a development upon earlier ships.¹⁶ Viewed from behind, the ship was almost pear-shaped: broad at the waterline and curving strongly inward and upward to the narrow deck that Witsen mentions. The width of the hull was almost the same from fore to aft, so that the ship had a very spacious hold compared to ships with a slenderer hull, narrowing from amidships to fore and aft. According to Witsen, the deck of the flute was narrower amidships where the measure was to be taken so that when seen from above the flute would have a slight wasp-waist.¹⁷ Furthermore, compared to other types of ships of the same period, the hull of

15 D. Velius, *Chronyke van der Stadt van Hoorn* (1604) 215, quoted in Bernhard Hagedorn, *Die Entwicklung der wichtigsten Schiffstypen bis ins 19. Jahrhundert* (Berlin/Hamburg 1914) 102-03; Sleeswyk, *De Gouden Eeuw*, 20; cf. Van Beylen, 'Scheepstypen' in: L. M. Akveld a.o. eds., *Maritieme Geschiedenis der Nederlanden. Deel 2* (Bussum 1977) 28; Unger, *Dutch Shipbuilding*, 36-37.

16 See an engraving by Pieter Bruegel de Oude in 1564 - 30 years before the flute first appeared - depicting a ship with form that is almost similar to the flute. - Mentioned by Van Beylen, *Schepen van de Nederlanden*, 101; shown by Unger, *Dutch Shipbuilding* opposite page 40.

17 Cf. note 3.

the flute was markedly longer in proportion to its width, with a ratio increasing rapidly from four to one, to a maximum of six to one.¹⁸ A ship with a length of 120 feet, a width of 20 feet and a depth of 12 feet would, on a reduced scale, have the same dimensions as Noah's Ark. This was presumably what was intended by the pious Mennonite Peter Jansz. Liorne, who was initially mocked for his "Noah's ships".¹⁹

In addition to a greater loading capacity than contemporary ships, the flute had lower building costs. Pine was used in part to replace oak²⁰, also resulting in a lighter ship. Scholars disagree on whether this led to a faster or a slower ship.²¹ The strong sailing capacities of the flute also meant that it required a smaller crew and was thus cheaper to operate.²²

The Sound Toll Registers do not record whether a ship is a flute or another type of ship, therefore as the first flutes are supposed to have sailed in 1595, any ship recorded in the registers from then on may have been a flute.²³ The question is therefore whether the toll-officers in Elsinore recognised a flute when they saw one. If one imagines them calculating the number of lasts of the ships by means of the width of their decks, as Witsen states²⁴, it is obvious that they would have miscalculated its volume to the benefit of the shipmasters and merchants. Yet if that was the case, one would have to argue that the toll-officers in general were rather volume-blind and not able to discern between the round-bellied flute and its more slender cousins. In addition, one would have to assume that in around 1600, the toll-officers actually measured the width, length and depth of the ships during the toll-clearance. The toll registers show that this was not the case.²⁵

18 Velius, *Chronyke van der Stadt van Hoorn* (1617²) 260. Quoted in Hagedorn, *Die Entwicklung*, 103, note 2; Van Beylen, *Schepen van de Nederlanden*, 103-04; Sleeswyk, *De Gouden Eeuw*, 20, 29.

19 Sleeswyk, *De Gouden Eeuw*, 32-33. Noah was told to build his arch 300×50×30 ellen (Genesis 6,15.)

20 Unger, *Dutch Shipbuilding*, 37; cf. Van Beylen, 'Scheepstypen', 30; Wildeman, 'Fluit', 78: "Fluiten werden licht en goedkoop gebouwd (...)"

21 Hagedorn, *Die Entwicklung*, 108; Olechnowitz, *Der Schiffbau*, 13; Van Beylen, 'Scheepstypen', 29 and Wildeman, 'Fluit', 78 sees the flute as a fast ship, while Alexiou, *Two 16th century ships*, 47, judges the flyte to be a slow sailing vessel, and Unger, *Dutch Shipbuilding*, 37 seems to go in between. The lighter building materials gave it greater speed, but the form of the flute meant a slower ship. "The

sacrifice of speed did not bother builders or shippers. The fluyt was intended (...) for bulk carriage, where speed of delivery was much less important than cost."

22 Olechnowitz, *Der Schiffbau*, 13; Van Beylen, 'Scheepstypen', 31-32; *Schepen van de Nederlanden*, 104; Unger, *Dutch Shipbuilding*, 37; Wildeman, 'Fluyt', 78.

23 Johan Schreiner, *Nederland og Norge 1625-1650. Trelastudførsel og Handelspolitik* (Oslo 1933) 35: In the 1630s 70% of all ships in the Sound were supposedly flutes. In the next decade it went up to 90%.

24 Also Unger, *Dutch Shipbuilding*, 46: "The measure of breadth was taken at the height of the deck and near the middle, so builders put the the deck high up and made bow and stern relative to the width midships."

25 The first Danish table of measurement was issued in 1632. Cf. below in this article.

THE CLEARING PRACTICE IN ELSINORE AROUND 1600

The entry of a single passage in the toll register of 1614²⁶, almost twenty years after the first appearance of the flute, provides information about the clearing practices of the tollhouse in Elsinore. It concerns the toll-clearing on 30 June of the vessel of shipmaster Carnelis Siffuerssenn from Harlingen, who had arrived from the Baltic Sea. He paid the normal ship's toll of two rosenobels and one daler for his loaded ship of under 100 lasts. This typical information is followed by an unusual statement:

He had a ship the previous year, which he had run through the Sound on four return voyages without knowing the size of the ship as the ship was loaded with different kinds of goods on these voyages. He has now sold this ship and it has since been found out that he had had more than 100 lasts of rye loaded in the ship. He therefore now paid for these 4 voyages 8 rosenobels and 4 dalers.

At the very least, the following information can be extracted from this entry:

1. The shipmaster did not know the exact size of his ship and the ship was not measured in the Sound during the clearance. The toll-officers trusted the shipmaster's declaration. There was apparently no ready device to measure the ship's width, length or depth. It would, incidentally, have been difficult if not impossible to measure the depth of the hold of a loaded ship.
2. It was acceptable for a master sailing through the Sound not to know whether the loading-capacity of his vessel was over or under 100 lasts. If it was found out that he had previously declared it to be under 100 lasts, he was not penalized. He simply paid the balance of toll in arrears.
3. The size of the ship was calculated on the basis of the cargo described in the documents that the shipmaster carried with him. The size of a ship sailing in ballast could not be assessed. A trustworthy assessment took a ship loaded with either a single kind or range of commodities, measured in lasts, such as rye, salt or barley. A mixture of commodities was recorded in a mixture of weights and measures, making it difficult to assess the ship's loading-capacity correctly.
4. The toll-officers came to know the shipmasters and their ships so that a master's past could catch up with him, even if he had sold his ship. It is not clear from the toll registers when Carnelis Siffuerssenn had sailed through the Sound with a cargo of more than 100 lasts of rye. He appears in an entry of May 1614 with a cargo of 82 lasts of rye²⁷, but even with the "fjoring" of the crew added, the cargo apparently did not exceed 100 lasts. Perhaps the new owner of the ship had loaded more than 100 lasts on the ship and thus gave Carnelis Siffuerssenn away.

26 STRO 056_430 (June 30 1614).

27 STRO 056_414.



Bird's-eye view of Elsinore with Kronborg Castle, print in G. Braun and F. Hogenberg *Civitates orbis terrarum* (Cologne 1618). AMSTERDAM, HET SCHEEPVAARTMUSEUM.

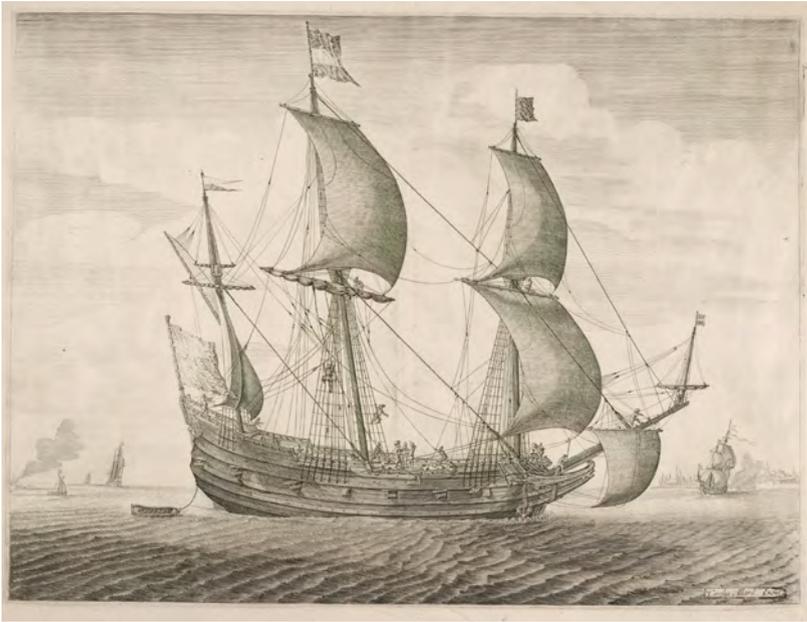
The overall conclusion from this single entry is that no measurement of ships took place in Elsinore during at least the first 20 years that flutes sailed in the Sound. The toll-officers had to trust the information given by the shipmasters, orally or in documents, and even the shipmasters themselves were often not sure of the exact size of their ships.

Measuring all ships would in any case have caused near insurmountable problems for the toll-officers, as they would have had to physically inspect all the ships waiting for clearance in the Sound, measuring the length, width and depth of each. Apart from the practical problems with the measuring itself, there were simply not enough employees at the toll-office to do this work. In the year 1595 alone, when the flute was created, 6.292 ships passed through the Sound in around nine months.

The conclusion drawn from the Carnelis Siffuerssenn case is confirmed by the case of Stoffel Heddes in 1596. This shipmaster from Harlingen had passed Kronborg six times prior to 1596, with reservations about the size of his ship, as it was new.²⁸ Each time he had paid for a ship under 100 lasts, but when he arrived in Elsinore with a cargo of salt in 1596, it was clear that the ship was over 100 lasts. He paid accordingly for this passage and paid in arrears 1 rosenobel and ½ daler for each of the previous passages but was not subject to any extra payment as a penalty for making incorrect declarations. He had made, in the words of Richard W. Unger, “an honest mistake”.²⁹ Heddes was

28 STRO 036_129.

29 “an honest mistake”: Email to the author May 28 2017.



A flute, etching by Salomon Savery, c. 1650. AMSTERDAM, HET SCHEEPVAARTMUSEUM.

indeed an honest man, although generally the shipmasters were excused for being ignorant of the true size of their ships.³⁰

Stoffel Heddes' clearing at over 100 lasts in 1596, can serve as an example for calculating how much less a shipmaster paid for a ship measuring under 100 lasts than for a ship of over 100 lasts. He paid in total: 2 rosenobles, 83 dalers, 1 goldgylden, 2 marks and 20 skillings plus 6 barrels of salt in ship-toll, salt-toll, clerk and buoy money, beacon-money, thirtieth penny and last-toll.³¹ If he had declared under 100 lasts he would have only saved 1 rosenobel and ½ daler in ship-toll, or around 5%. This relative saving would, of course, have been considerably bigger if he had passed with his vessel in ballast, but it would have been the same in hard cash. A saving of that size would hardly have stimulated the "invention" of a special vessel.

In around 1600, the loading capacity of a ship and consequently the toll it paid, was decided by the volume of the cargo. Since the introduction of beacon money in 1561 and last-toll in 1567, this had to be certified in documents carried by the shipmaster or confirmed by the shipmaster's oath in the toll-office. Even the documents were warranted by oath, as the authorities in the ship's homeport did not measure the quantities of the commodities on board, but took oaths from the merchants and certified the cargo accordingly.³²

30 See e.g. STRO 006_446; 008_186; 061_417-419.

31 The toll is registered in four sections of the toll register: STRO 036_050: thirties penny, 036_129: ships-toll, salt-toll and clerk and

buoy money, 036_429: beacon-money and 036_560: last-toll.

32 A certificate can be found in STRO 001_062-063.

The procedure whereby the shipmaster's declaration of the size of his ship was compared with the bills of lading he carried, originated at least as early as 1562, when the ship of one of the masters appeared to be over 100 lasts and was required to pay in arrears for 26 passages in which he had declared his ship to be under 100 lasts. The king became involved in this case but pardoned the shipmaster.³³ This set the procedure that was followed in the years to come.³⁴

Again, the entries in the toll registers convincingly show that the toll-officers tended to trust the shipmasters' word when they declared their ships sailing in ballast to be under 100 lasts, and that the masters paid accordingly until the size of their ships was judged to be greater. Only then did they have to pay, in arrears, the difference in the ship's toll on previous passages.

DELIBERATE FRAUD

If a mistake in the declaration of a ship's size could be characterised as an honest mistake, it was quite another thing when the officials at Elsinore discovered that a fraudulent declaration of the cargo had been deliberately made, for the purpose of paying a lesser amount in toll. When fraud was discovered, the contraband was confiscated, and a heavy fine could be added.³⁵

Toll-officer Jens Mogensen Rosenvinge intended to suppress this kind of fraud when, as early as the beginning of the 1560s, he introduced the inspection of ships in the Sound.³⁶ It was for the same purpose that in August 1618 King Christian IV appointed an inspector to find "the secret goods" on board the ships.³⁷ His job was specifically to discover contraband – not to measure ships and calculate their loading-capacities.

This appointment in 1618 occurred just after the introduction of the extended flute mentioned by Velius.³⁸ The extension increased the ship's loading-capacity significantly. This was quite a sudden development and the effect can also be observed in the toll registers.³⁹ In 1618, the remarkably large number of 26 "unwitting" shipmasters had their ships upgraded to over 100 lasts based on the size of their cargo.⁴⁰ In 1619, the relevant number had

33 STRO 003_666.

34 STRO 004_465 (1563: 10 passages); STRO 006_422, 446 & 525 (1565: 4 passages, 10 passages & 3 passages); STRO 008_186 (1567: 4 passages); STRO 011_055 (1569: 5 passages); STRO 029_134 (1589: 1 passage – new ship).

35 STRO 049_175 (1607).

36 Mogens Jensen, 'Rosenvingebrødrene i Helsingør fra ca. 1510 til 1564', *Zise, Told- og Skatthehistorisk Tidsskrift* 40:1 (2017) 4–60, see 16–17.

37 L. Laursen, ed., *Kancelliets Brevbøger vedrørende Danmarks indre Forhold*. Bd. VI, 1616–1620 (Copenhagen 1919) 455.

38 See note 18.

39 According to Hagedorn, *Die Entwicklung*, 111, the number of ships over 100 lasts from the Netherlands passing through the Sound increased from 530 return passages in 1617 (ca. 17%) to 1990 return passages in 1620 (ca. 50%).

40 STRO 061_417–419.

diminished to five⁴¹, and in the following years there were no upgradings.

The most obvious explanation for the 1618 upgradings is that the shipmasters of the new, longer flutes, routinely and perhaps unwittingly, declared the size of their vessels to be under 100 lasts when sailing through the Sound in ballast, but had to correct that assessment when the bills of lading for their return passage showed that the ships carried over 100 lasts.⁴² After some initial problems, in a few years the matter was settled: not by using a measuring device but by using the bills of lading. That the introduction of longer ships tempted some masters to not show all of their documents or to present false bills, and thus commit deliberate fraud, can be concluded from the necessity of employing inspectors to find “the secret goods”.

TABLES OF MEASUREMENT

The first Danish table with measurement of ships was published in 1632, in an open letter from the King to the toll-officers.⁴³ Although this letter is not a general measuring directive, but rather gives some guidelines to the officers, one must assume that the table was at least used in cases of doubt, so that measurement of ships did to some extent begin in Elsinore in 1632⁴⁴ and apparently not before. Even in 1632, it occurred that the cargo capacity of a ship was established to be over 100 lasts on the basis of the size of the documented cargo, leading the shipmaster to pay in arrears for four return-passages on which he had declared the ship to be under 100 lasts.⁴⁵ Monrad Møller, the Danish scholar who has studied this issue in the greatest depth, judges that the 1632 table was based on experience partly gathered through reasonable estimates and common sense.⁴⁶ The Danish and Dutch authorities do not seem

41 STRO 062_262.

42 Aksel E. Christensen, *Dutch Trade to the Baltic about 1600. Studies in the Sound Toll Register and Dutch Shipping Records* (Copenhagen/The Hague 1941) 345, table 21 which shows an increase in loading-capacity to over 100 lasts in 1617; cf. *Ibidem*, 100, Table 6.

43 V. A. Secher, *Corpus Constitutionum Daniae. Forordninger, Recesser og andre kongelige Breve Danmarks Lovgivning vedkommende 1558–1660*. Bd. IV (Copenhagen 1903) 564ff.; cf. Ole Degn, ‘Skibene måles’ in: Ole Degn and Erik Gøbel eds., *Dansk Søfarts Historie 2, 1588–1720* (Copenhagen 1997) 20.

44 Christensen, *Dutch Trade to the Baltic*, 342–43 assumes that the measurement first began in 1643 and concludes on this matter: “As late as the end of the 1640es it [the measurement of ships] was not definitely

introduced; it was an art of which only ship’s carpenters and not ordinary commercial and shipping experts had any knowledge, and the methods were not yet clarified.”

45 STRO 075_218 (6.6.1631) explains the matter, while the passage with the commodities is to be found in STRO 075_216. The skipper had declared his ship as a ballaster 16.5.1631 STRO 075_157. An earlier return passage from the same year can be found in STRO 075_151 (9.4.1631) and 075_209 (4.5.1631).

46 Anders Monrad Møller, ‘Skibsmålingen i Danmark 1632–1867’, *Årbog for Handels- og Søfartsmuseet i Helsingør* (1974) 16–47, see 18; cf. Christensen, *Dutch Trade to the Baltic*, 334: “As basis was still used the experience from practise: the carrying capacity of the ship were the number of lasts of corn or salt which the ship might carry.”



Two flute ships: the *Geele Fortuijn* a Baltic sailer and the *Liefde*, bound for Norway, etching by Reinier Nooms, 1650. AMSTERDAM, HET SCHEEPVAARTMUSEUM.

to disagree much on the measurement of ships going to and from the Baltic. A ship measured to be 100×23×13 feet in length, width and depth, would be calculated by the Danish table as carrying 100 lasts, which is close to Witsen's statement that Ooster-vaerders of 100×22×11 feet carried 100 lasts.⁴⁷ This is particularly the case if we take into account that the Danish table should cover both Ooster-vaerders and Noorts-vaerders, with Noorts-vaerders generally being two feet deeper than the former.

NOORTS-VAERDERS

Does all this mean that Witsen was totally wrong in talking about the profit shipmasters could make at the toll-office thanks to the form of the flute? He was not, but to understand why, we have to look to Norway, the other part of the Danish kingdom, instead of the Sound. Witsen himself indicates this as he begins the paragraph in question by discussing “*Schepen die om't Norden hout (...) haelen (...)*” [Ships sailing North to get wood]. Indeed the whole section, concerns “*Noorts-vaerders maet*”.⁴⁸ Thus even though Witsen also mentions that ships often brought grain from the East, there is little doubt that he is thinking of the specialized form of flute that sailed to Norway for timber.

47 Witsen, *Aeloude en Hedendaegsche Scheeps-Bouw en Bestier*, 160.

48 Ibidem, 160; cf. Ibidem, 242, where he writes “*dat eenig geschil ontstack, tusschen zijn Koninklijke Majesteit van Denemarken, en haer Hoogmogende, nopende het aental der lasten, waer op die Scheepen, die naer Noorwe-*

gen om hout varen (...)” [Some disagreement had arisen between His Royal Highness of Denmark and Their High and Mighty [=Parliament of the Dutch Republic] regarding the number of lasts for ships sailing to Norway for timber].

The Norwegian export of timber was mostly carried by Dutch ships. The amount increased around 1630, but the toll yield did not see a corresponding rise, thanks to systematic fraud by the shipmasters on the timber-ships.⁴⁹ Consequently the King took action, partly to protect the forests, but mostly to increase the toll yield.

In December 1630 King Christian IV wrote a letter to his governor in Norway, Christopher Urne, and one of his lords of fief (Dutch: *leenheer*), Steen Villumssøn Rosenvinge, asking them for advice on how the timber-toll could correspond better with the timber-loads carried on board the ships, as he had observed great embezzlement and affront to his rights.⁵⁰ Their response a few months later proposed that the toll should be levied primarily on the tonnage of the ships, rather than the current system based on each type of timber, combined with a small toll to be paid according to the size of the ship.⁵¹

TOLL ROLL AND TABLE OF MEASUREMENT, 1632

This proposition by Urne and Rosenvinge was the basis of a Toll Roll dated 12 January 1632⁵², and this included the assessment of the tonnage of ships, following the rules stipulated in the previously-mentioned table on the measurement of the tonnage of ships from the same date.⁵³

Previously, the assessment of timber-ships seems to have been done in a rather arbitrary manner. The toll-officers more or less accepted the number of lasts declared by the shipmasters. To mention only a few examples, there were ships whose tonnage was stated as 90–140 lasts in charter-parties in the Netherlands in 1628 but declared in Norway as ships of 40–50 lasts. Ships declared to be 18–23 lasts in the autumn of 1631, paid toll for 70–90 lasts in the spring of 1632.⁵⁴ The practice of calculating the size of a timber cargo on the basis of the ship's tonnage gave the shipmasters an open opportunity for fraud. The toll roll of 1632 deprived them of that opportunity.

Inspectors had functioned in Norway since at least 1619.⁵⁵ Before 1632, their instructions said nothing about the measurement of ships. Just like their Danish colleagues, their job was to search for forbidden goods⁵⁶, normally meaning oak. The role of an inspector was not easy. The locals were eager to sell their timber and did not wish to support inspectors as they found that

49 Schreiner, *Nederland og Norge*, 59–60.

50 O. G. Lundh and J. E. Sars eds., *Norske Rigs-Registranter*, Bd. VI, 1628–1634 (Christiania 1877) 265.

51 Schreiner, *Nederland og Norge*, 60–61.

52 Hans Paus ed., *Gamle Kongelige Forordninger og Privilegier udgivne for Kongeriget Norge* (Kjøbenhavn 1751) 725–30: "Told-Rulle hvorefter Træ-Last-Tolden udi Norge herefter skal opberges" [Customs-Roll, after which the

wood cargo toll in Norway shall be registerd hereafter].

53 Secher, *Corpus Constitutionum Daniæ*. Bd. IV, 564–66.

54 Schreiner, *Nederland og Norge*, 61–63.

55 O. G. Lundh and J. E. Sars eds., *Norske Rigs-Registranter*. Bd. V 1619–1627 (Christiania 1874) 43–44.

56 *Ibidem* 90, 203, 301; Bd. VI, 21, 307–08.



Dutch flute taking in wood at a rocky coast, detail of an anonymous painting, c. 1650. AMSTERDAM MUSEUM.

they interfered with their business. The shipmasters, of course, did not like having their ships inspected. It was apparently impossible to get the necessary locals to row the inspector to the ships, and on one occasion when the inspector was climbing up a rope to get on board a ship, the rope was cut with an axe and he fell down.⁵⁷ In 1640, an inspector was even shot dead.⁵⁸

The new practice introduced in 1632 provoked a lot of complaints from Dutch shipmasters, which the King answered by saying that he found it odd that the Dutchmen complained that they could no longer deceive him.⁵⁹ Hard figures show the benefit of the changes for the King. In 1631/32 the timber toll yielded 11.500 dalers; in 1632/33 56.000 dalers; and in 1642/43 149.700 dalers.⁶⁰

The measurement table of 1632 might have created some order, but there were still problems. For example, in the summer of 1632 a shipmaster from Hoorn had his ship measured to be 65 lasts by the toll-officer in Larvik. A year later, the same ship was measured to be 90 lasts and when the master came to pay his toll, the inspector measured the ship once more, concluding it was 110 lasts.⁶¹

57 Lundh and Sars eds., *Norske Rigs-Registranter*. Bd. V, 44.

58 Schreiner, *Nederland og Norge*, 58.

59 Ibidem, 63 note 6: "(...) dat hem veele jaeren den tol in Norwegen waere gestoolen, ende nu de schippers tselve niet meer conden doen, claechden sij, mijn vragende ofte dat recht waere" [That for many years the toll in Norway was stolen from him, and now the skippers no longer could, they complain and ask me if

this [the new rule] was just].

60 Steffen Heiberg, 'Toldordinansen 12. januar 1632', *Zise, Told- og Skatthehistorisk Tidsskrift* 3 (1982) 3–18, see 16; cf. Steffen Heiberg, 'De ti tønder guld, rigsråd, kongemagt og statsfinanser i 1630'erne', *Historisk Tidsskrift*, Bd. 76 (1976) 25–58, see 37–38; Steffen Heiberg, *Christian 4. – en europæisk statsmand* (Copenhagen 2006) 357.

61 Schreiner, *Nederland og Norge*, 65–66.

MEASUREMENT TABLE OF 1640

In 1640, a number of large Dutch ships were arrested for fraud and sent to Copenhagen to have their cases judged by the newly established Admiralty. The King used this opportunity to measure the length, width and depth of these ships, expanding the measurement table from 1632 to include ships over 100 lasts.⁶² Each foot over 100 feet was set at 2 lasts.⁶³

Incidentally, the new table produced lower results than Witsen's measurements for Ooster-vaerders. Witsen assesses a flute of 115 feet long at 150 lasts and a flute of 125 foot long at 200 lasts.⁶⁴ The Danish table of 1640 would give 130 and 150 lasts respectively. The Dutch representative in Elsinore officially complained about the seizure of the ships, but secretly blamed the shipmasters for trying to conceal up to 3/4 of their cargo from the Danish authorities.⁶⁵

The next step was taken in 1641 when the King decided that all Noorts-vaerders should be measured when they first arrived in Norway, and that the measurement should be burnt into the ship's sailboard (the board in front of the mainmast). This rule would be valid for a probationary period of one year and then evaluated.⁶⁶

The probationary year seems to have been extended to become a permanent order. In April 1642, the Danish King established a new regulation, or rather a compendium of previous regulations, stating that all ships should be measured according to the tables of 1632 and 1640.⁶⁷

62 C. F. Bricka and J. A. Fredericia eds., *Kong Christian den Fjerdtes egenhændige Breve*. Bd. IV 1636–1640 (Copenhagen 1882) 401–02 (Letter to admiral Klaus Daa and rentemester Jørgen Vind).

63 Secher, *Corpus Constitutionum Daniæ, Forordninger, Recesser og andre kongelige Breve Danmarks Lovgivning vedkommende* 1558–1660. Bd. V (1903) 64–65.; cf. Anders Monrad Møller, 'Skibsmålingen i Danmark fra 1632 til 1687 – en sidste gang' in: *Emilie, Louise og de andre, maritime artikler og essays* (Forlaget Falcon 2008) 117–153, see 118.

64 Witsen, *Aeloude en Hedendaegsche Scheeps-Bouw en Bestier*, 160.

65 "Deselvige hebben in den tolle in Noorweeghen soo veel versweegen, dat ick mijn selfs schaeme, eenige de helfte, andere drie vierdepaert van haere ladinge" [During the toll-clearing in Norway they have concealed so much that I am embarrassed, some half of their cargo, other three quarters]; Schreiner, *Nederland og Norge*, 73 note 3.

66 Schreiner, *Nederland og Norge*, 87; L. Laurssen ed., *Danmarks-Norges Traktater 1523–1750*.

Bd. IV 1626–1649 (Copenhagen 1917) 498: "Es wolten auch I. Kön. Mat. die vorgeschlagene mäss- und brennung der schiffe uf ein jahr versuchen, damit sie ohn betrug und die commercirende nich mit unnötigem ausladen beschweret werden, doch solte den visiteurn an nötiger gebürlichen untersuchung hiedurch nicht benommen werden" [His Royal Highness also wanted to test the proposed measurement and burnmarks of the ships for a year, that they were not fraudulent so that the merchants should not be not be burdened with unnecessary unloading – but the inspectors should not be hindered in making a appropriate inspection, because of this].

67 Rigsarkivet, Danske Kancelli, *Norske Tegnelse 1640–1648*, "Forordning om toldrulle och andet udj Norge", fol. 150R–155R (<https://www.sa.dk/ao-soegesider/da/billedviser?epid=19976852#268061,50631834>) (9.4.1643); O. G. Lundh and O. A. Øverland ed., *Norske Rigs-Registranter*. Bd. VIII, 1641–1648 (1887) 269–76; Paus, *Gamle Kongelige Forordninger*, 782–89.

THE TREATIES OF 1645 AND 1647

During the negotiations that ended the so called Torstensson War between Sweden and Denmark, the Netherlands acted initially as a mediator alongside France, but sided with Sweden on the question of toll.⁶⁸ A treaty, valid for 40 years, was signed in Kristianopel on 13 August 1645. It included toll privileges for the Dutch ships in the Sound that practically equalled those of the Swedish.⁶⁹

As for the timber trade in Norway, it was decided that the measurement of ships should be carried out by two Dutch and two Norwegian shipmasters (§ 9 of the treaty) and the result should be burned into the ship's sailboard and its side fore and aft, then registered with the local authorities. The toll was decreased to the level of 1628 and it was decided that negotiations should take place as soon as possible, concerning a timber toll that would be levied on the basis of the ships' tonnage (§7 of the treaty).⁷⁰

These negotiations took place in the Netherlands from August 1646 to February 1647 and resulted in a treaty on the measurement of ships and the timber toll in Norway.⁷¹ The King's son-in-law Corfitz Ulfeldt, was the leader of the Danish delegation. The result of the negotiations seems to indicate that he was more focused on the size of the toll per last, than on the number of lasts per ship and therefore was seriously misled.

The parties agreed that the timber toll should be based on the tonnage of the ships and amount to a fixed sum per last. The ships should be measured in one of the five or six most frequently used ports in the Netherlands, to make it easier for the shipmasters. The measurements should be carried out by an equal number of Danish and Dutch shipbuilders, four from each country (§2 of the treaty). The measurement should be burned into the sailboards and the sides of the ships fore and aft, and a letter of measurement should be carried by the ship (§5 of the treaty).

The treaty included a charter of measurement showing considerably lower tonnages than for example the Danish charter of 1640. In addition, 1/5 should be deducted from the measurement as it was calculated by loads of grain or salt, and timber could not be stowed as effectively as these commodities. It was here that Ulfeldt was seriously misled by the Dutch negotiators. It is correct that timber could not be stowed in the same way as a bulk-cargo of grain

68 Laursen, *Danmarks-Norges Traktater 1523–1750*, IV 1626–1649, 481–87; cf. Leon Jespersen, "Hvorfor den blev betalt, da vi ikke mere herskede i Sundet, må Vorherre vide." Øresundstolden og Roskildefreden 1658' in: Ole Degn, *Tolden i Sundet* (Copenhagen 2010) 295–324, see 305.

69 Laursen, *Danmarks-Norges Traktater*, IV, 476–493; cf. Venge, *Dansk Toldhistorie I*

(Copenhagen 1987) 257–60.

70 Laursen, *Danmarks-Norges Traktater*, IV, 490; cf. Schreiner, *Nederland og Norge*, 96–98.

71 The treaty was signed on 2nd/12th February 1647 (two dates because the Netherlands had changed to New Time). Laursen, *Danmarks-Norges Traktater*, IV, 520–46; cf. Schreiner, *Nederland og Norge*, 100–05.

or salt. However, while a ship could not be entirely filled with grain or salt, due to their heavy weight, a ship with a load of timber could be filled to the rail and even above as deck cargo. The deduction of the number of lasts was thus deceptive, as anyone with knowledge of timber ships would know. Apparently Ulfeldt lacked this knowledge.⁷² The treaty defined where the measurements of length, width and depth should be taken. The width had to be measured just in front of the main mast (§4 of the treaty). Ships which had not been measured in the Netherlands should be measured in Norway before loading, by an equal number of Norwegian and Dutch shipmasters, with at least three from each country (§ 18 of the treaty).

The question of the toll amount per last was solved by a long-lasting negotiation. Ulfeldt began demanding 2 rigsdalers and 1 ort per last. His Dutch counterpart offered ½ ort or 1/18 of Ulfeldt's demand. After a couple of months, they agreed on 1 rigsdaler per last (§10). The treaty was intended to solve all the problems related to the timber toll in Norway, but it was not successful. Very soon it led to complaints from the Norwegians, especially concerning ships of the so-called new form, that had allegedly been built after the treaty was concluded.⁷³ They were broader fore and aft than amidships and were said to look more like warehouses than ships.⁷⁴ They could carry a greater load than ships of older designs and it was maintained that their masters saved 2/5 of the toll instead of 1/5. The Dutch rejected these complaints. The ships of the new form were said to have also been built before the treaty⁷⁵ and that furthermore they were in accordance with its terms.⁷⁶ The Danish King did not accept the Dutch arguments, and ordered his leading toll-officer in Southern Norway to re-measure Dutch timber-ships and take particular note of whether they were of "the new fabrica". If so, they were to add 1/6 to 1/4 to the number of lasts.⁷⁷ The Norwegian toll-officers also complained that the numbers of lasts burned into the ships and the letters of measurement often did not correspond, and that the burned-in numbers had been erased and/or the letters of measurement changed. On the Dutch side, there were complaints that contrary to the treaty of 1647, re-measurements were conducted. New negotiations to solve these problems took place in the Netherlands in 1657–58, but

72 Many skippers paid for considerably fewer lasts than they themselves declared in their certeparties. Schreiner, *Nederland og Norge*, 105.

73 L. Laursen ed., *Danmark-Norges Traktater 1523–1750*. Bd. V 1651–1664 (Copenhagen 1920) 246–259; Schreiner, *Nederland og Norge*, 105.

74 L. Laursen ed., *Danmark-Norges Traktater 1523–1750*. Bd. VI 1665–1675 (Copenhagen 1923) 61; Schreiner, *Nederland og Norge*, 105.

75 Cf. that the Treaty of February 1666 talks about "(...) soorte van schepen, die ten tijde van het aengaen van het voorsc. tractaet niet

bekent en sijn geweest, ende ordinaris benoempt worden van de nieuwe fabricque, (...)" [forms of ships which at the time of said treaty were not known and normally were described as the new form]: Laursen, *Danmark-Norges Traktater*, VI, 110.

76 Laursen, *Danmark-Norges Traktater*, V, 250; cf. Witsen, *Aeloude en Hedendaegsche Scheeps-Bouw en Bestier*, 160: "(...) en na den eisch werdt gemaect" [and was made according to the rule].

77 E. A. Thomle ed., *Norske Rigs-Registranter*. Bd. XI 1653–1556 (1890) 476–81.

the status quo remained. Denmark could demand re-measurements of ships, but these should take place in the Netherlands in accordance with the rules of the treaty of 1647. The discussion of ships with a new shape was postponed to a later date.

THE TREATIES OF 1666 AND 1669

This date came in 1669, when a new method of measurement was agreed upon. The talks for this had begun in 1665–66, during meetings on a number of economic issues to be settled between Denmark and The Netherlands. The Norwegian timber ships and their toll was one item on the agenda.

The Danish King wanted the treaty of 1647 to be cancelled. His administration had calculated that it had cost Denmark 4.5 million rigsdalers in lost revenue, compared to what it would have received under the Kristianopol Treaty of 1645.⁷⁸ The Netherlands refused, but certain changes were made in a treaty signed in February 1666.⁷⁹ It was agreed that one last of timber should be equal to 4000 Dutch pounds, and the 1/5 deduction from the total measure was abolished.

In 1669, three test-ships were measured⁸⁰: the *Vergulde Hert*, at 120 feet (the new form), the *Brouwer*, at 116 feet, 6 inches (an older form) and the *Waterhondt*, at 116 feet, 4 inches (the oldest form). All of them may have been flutes and all were Noorts-vaerders. They were almost equal in length. The *Vergulde Hert* was 3½ feet (about 3%) longer than the other two, but the tonnage measured with iron balls showed that the *Vergulde Hert* could carry a load of around 1/4 to 1/3 heavier than the other two respectively.

As agreed upon in 1666, a timber-last should be reckoned as 4.000 Dutch pounds. By knowing the weight of the iron balls, it was easy to calculate the number of lasts each ship could carry: 227½, 183½ and 168 3/8 lasts respectively. These numbers incidentally far exceeded the corresponding numbers for ships over 100 feet that were laid down by the Danish table of 1640.

The width and depth of the ships were subsequently measured in three places, rather than one as previously, and the length was multiplied by the average width and depth. The result was divided by the number of lasts, resulting in the quotients of 231 6/7, 239 1/3 and 256 respectively. The average quotient of these three was 242½, and it was decided that this quotient should be used in the future to determine the number of lasts, once the multiplication of the length with the average width and depth had been carried out. According to

78 Laursen, *Danmark-Norges Traktater*, VI, 65

79 Laursen, *Danmark-Norges Traktater*, VI, 108–14.

80 Witsen, *Aeloude en Hedendaegsche Scheeps-Bouw en Bestier*, Appendix, 33–37; Møller, *Skibsmålingen i Danmark 1632–1867* (1974)

22–25; Anders Monrad Møller, 'Skibsmåling – nok engang', in: Hans Jeppesen and Kåre Lauring eds., *Handels- og Søfartsmuseets Årbog* (2006) 99–108, see 102–105, Møller, *Skibsmålingen i Danmark*, (2008) 127–30.

this method, the *Vergulde Hert* would be measured as 217½ lasts, thus gaining a small saving of 10 lasts. More generally, the new method removed the advantage of wasp-waisted ships with extensions fore and aft, as the measurement was also taken there.

Witsen, who wrote just two years after this agreement upon measurement, summarised it as follows: “Dog dit winst vinden heden is te niet gedaan, door een andere wijs van meeten (...) waerom oock nu het mismaeckt bouwen, en geweldigh uitspringen, achtergelaten werdt.” [But the advantage is now taken away by a different way of measuring ... that is why now the deformed building and the enormous widening are no longer being done].⁸¹

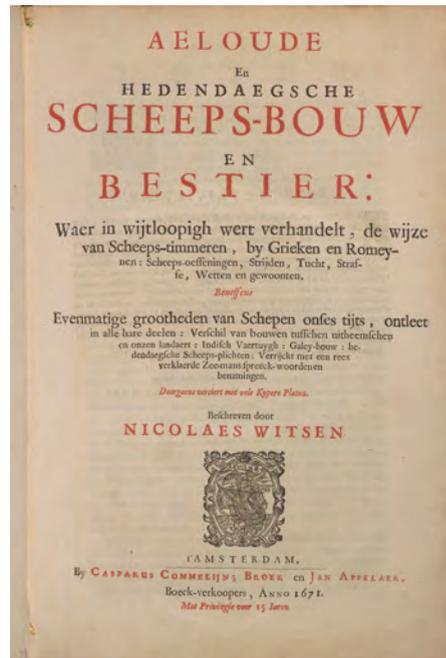
The so-called new form of the flute, making it look like a warehouse, must have had a negative impact on the sailing abilities of the ship. It therefore must have been advantageous to return to a more typical design, after the toll benefits had been overturned.

CONCLUSION

It is a very persistent myth that the flute was developed and functioned to evade the Sound toll.

The toll registers, however, show that during the 70 years from 1562 to 1632 it was a well-established procedure in the Sound for the toll-officers to use the bills of lading to determine the loading-capacities of the vessels passing through. They did not employ any sort of measuring device to assess the width, length and depth of the vessels and then calculate the size of the ships. Consequently, Nicolaes Witsen’s assumption that the round-bellied flute with its wasp waist was a Sound toll saver, repeated by many scholars up to the present day, finds no support in the toll registers from before 1632. The form of the ship may have increased its loading-capacity and may have decreased the size of her crew, to the benefit of her owners, but this did not deceive the toll-officers and did not decrease the amount of toll paid.

81 Witsen, *Aeloude en Hedendaegsche Scheeps-Bouw en Bestier*, 160.



Title page of Nicolaes Witsen, *Aeloude en Hedendaegsche Scheeps-Bouw en Bestier*. 1671. AMSTERDAM, HET SCHEEPVAARTMUSEUM.

The shipmaster could of course tamper with his documents and commit fraud in order to decrease the toll. When fraud was discovered by the inspectors, who were appointed from 1618, the master paid a fine and lost the commodities that he had not declared.⁸²

The flute was, generally speaking, not designed to evade paying toll. Pieter Jansz. Liorne, who allegedly built the first flute, was not only a pious Mennonite, seemingly inspired in his shipbuilding by the dimensions of Noah's Ark, but also a businessman who wanted to build a ship with a better carrying capacity and lower freight costs than existing vessels. This proved to be successful and his ship was quickly copied. Before long, the flute was a common cargo ship on the seven seas. The seventeenth century is with good reason referred to by one author as "The Golden Century of the Flute".⁸³ There is, however, an exception. One specialized flute stood out as a ship designed to evade tolls. Namely, the timber-ship that sailed to Norway, built from 1647 in the so-called new form, with a broader fore and aft than amidships. Up until to then, there had been many attempts to evade paying toll for the whole load of timber and these attempts had often been successful. However from 1647, flutes designed for timber transport were built with a wasp waist and an extended hull fore and aft to avoid payments. Despite being common knowledge, Norwegian toll-officers were unable to do anything, as the skippers played by the rules of the 1647 treaty. This stated that the measurement of the width should be taken amidships, which it was.

It is clearly this specialized timber-ship bound for Norway that Witsen describes. Whilst it evaded part of the toll, it deceived nobody. It was for this reason that the Danish King was so eager to have a new method of measurement accepted. He succeeded in 1669, after having to live with the so-called sailing warehouses for 22 years.

The primary cause of the widely and erroneously accepted notion that the flute was designed in part to evade the tolls due in the Sound, is the above-mentioned note in the margin of Witsen's book, in which he states that the vessels with narrow decks described in this section provoked a dispute about the payment of toll due in the Danish Sound. A second cause is the fallacious premise that the section contains a general description of the flute, rather than only that of the Noorts-vaerder.

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82 e.g. STRO 062_490 (1619); STRO 063_554 (1620); STRO 065_230 (1622).

83 Wegener Sleeswyk, *De Gouden Eeuw van het Fluitschip*.