Detailed Measurement of Edged Weapons from the Wiener Bürgerliches Zeughaus

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Abstract

In this article, two one–handed swords and five two–handed swords from the Bürgerliches Zeughaus in Vienna are described in image and text and presented together with their measurements. The weapons cover a wide range of time, from the 15th to the 17th century. An authentic reconstruction of the blades is made possible with these measurements. Furthermore, different measured and calculated parameters give insights into weapon handling.

I. Introduction

DETAILED MEASUREMENTS OF period weapons of an epoch are the most important source of information for the manufacture of authentic reproductions. Different parameters of blade geometry and mass distribution are also very illuminative for the interpretation of period fencing treatises.

In this article, seven swords of different types and from a wide range of time (15th –17th century) are presented and compared, regarding hilt–types and blade geometry.

II. Terminology

Most of these parameters are common to all swords and quite clear, although some need a more detailed explanation, which follows. We begin with directly measurable properties.

- *Ricasso Length* – Ricasso length is measured from the crossguard to the beginning of the blade.

- *Blade Length* – Blade length is measured from the end of the ricasso to the point for one–handed weapons and from the crossguard to the point for two–handed weapons.

- *Point of Balance (POB)* – The point of balance is usually considered the main parameter of handling and it can also be easily located by balancing the sword on a finger. However, it only determines a small part of the handling characteristics. For further information, see [Le Chevalier, 2011]. It is measured from the center of the crossguard.

- *Pivot Point 1* – The distance of the pivot point from the crossguard, when the sword is being held at the ricasso block and moved laterally.

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- *Pivot Point 2* – The distance of the pivot point from the crossguard, when the sword is being held at the rear end of the grip and moved laterally.

- *Crossguard Diameter* – The diameter of the crossguard at its thinnest point. This value is an indicator for the stability of the hilt.

A detailed explanation and a method for determination of pivot points and parameters like dynamic length and blade presence can be found in [Le Chevalier, 2011].

From the measurements listed above, following "virtual measuremens" can be obtained, which provide information about handling characteristics of bladed weapons.

- *Virtual Blade Weight* – This is the weight measured horizontally at pivot point 1 on the blade. It is a virtual indicator of perceived blade weight, not to be confused with actual blade weight.

- *Virtual Crossguard Weight* – This can be calculated as: overall weight minus blade weight.

- *Blade Presence* – This is a calculated parameter, representing the ratio of blade weight to overall weight.

III. Blade Cross Section Calculation

Blade cross sections can be calculated along each blade according to its shape. Formulas used are, as follows:
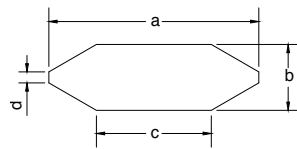
III.1. Hexagonal Cross Section

Figure 1: Hexagonal cross section

$$A = (b-d)c + ad + \frac{(b-d)(a-c)}{2} \tag{1}$$

III.2. Diamond Cross Section
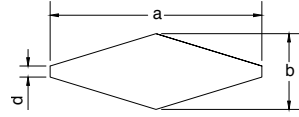
Figure 2: Diamond cross section

$$A = ad + \frac{(b-d)a}{2} \tag{2}$$

III.3. Lenticular Cross Section
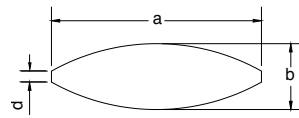
Figure 3: Lenticular cross section

Here, the cross section is approximated by circle segments, a precise calculation is not possible.

$$A = ad + \frac{\frac{1}{2}arctan(\frac{(b-d)}{a})((b-d)^2 + a^2) + \frac{(b-d)}{2}a((b-d)^2 - a^2)}{2(b-d)^2} \tag{3}$$

For sharp blades we can disregard the striking edge and therefore omit parameter d.

III.4. Fuller Cross Section
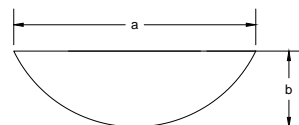
Figure 4: Fuller cross section

3

$$A = \frac{\frac{1}{2}arctan(\frac{2b}{a})(4b^2 + a^2)^2 + ab(4b^2 - a^2)}{16b^2}$$ (4)

IV. DESCRIPTION AND MEASUREMENT OF SEVEN BLADED WEAPONS
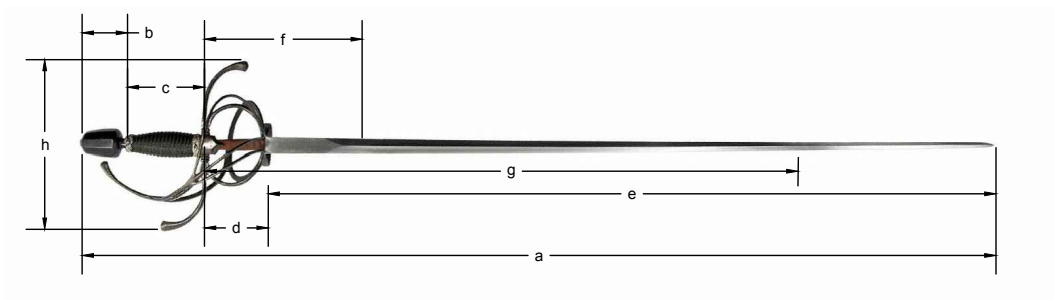
Figure 5: Sketch of one-handed sword dimensions.
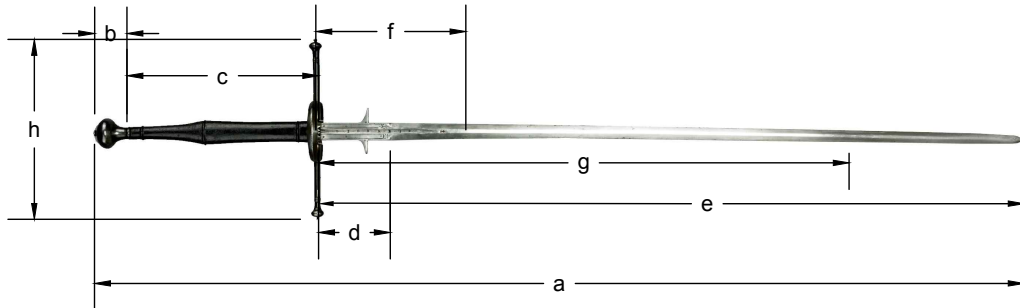
Figure 6: Sketch of two-handed sword dimensions.

IV.1. OBJECT 126.003

Object 126.003 is a hand–and–a–half sword from the last quarter of the 15th century. Because it was found during excavations, the surface shows strong corrosion marks. However, measurements of the blade were still possible. The blade is long and slim, with a bodkin point for optimum penetration. Overall weight at 896 g is quite low for a sword of this length, which results in quick and agile handling performance.

Classification according to [Oakeshott, 1991]:

- *Sword Type*: Type XVa
- *Hilt Type*: Type 7
- *Pommel*: Type T5

Figure 7: Object 126.003 – Hilt and Forte

Figure 8: Object 126.003 – Hilt and Forte

Figure 9: Object 126.003 – Point

Figure 10: Object 126.003 – Point

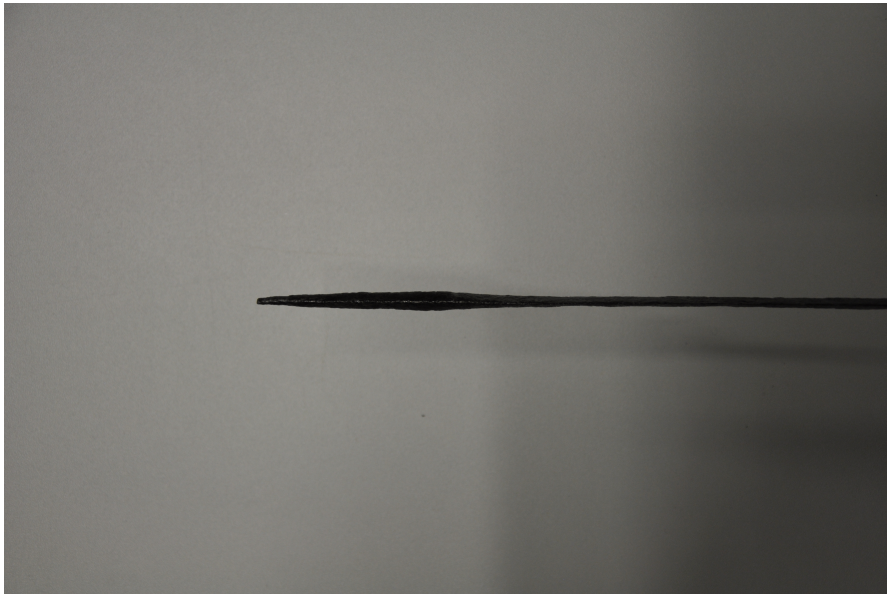|		126.003		
Overall Length [mm]	a	1305		
Overall Weight [g]		896		
Pommel Length [mm]	b	62		
Grip Length [mm]	c	195		
Quillon Block Thickness [mm]		7		
Ricasso Length [mm]	d	-		
Ricasso Width [mm]		-		
Ricasso Thickness [mm]		-		
Blade Length [mm]	e	1045		
Point of Balance [mm]	f	200		
Pivot Point 1 [mm]	g	-		
Virtual Blade Weight [g]		-		
Pivot Point 2 [mm]		-		
Virtual Crossguard Weight [g]		-		
Blade Presence [%]		-		
Number of Fullers		0		
Fuller Length [mm]		-		
Fuller Width [mm]		-		
Fuller Depth [mm]		-		
Distance Grip-Pommel [mm]		-		
Quillon Length [mm]	h	225		
Quillon Thickness [mm]		9x3		
Blade Cross Section		Diamond		
Quillon Cross Section		Rectangle		
Grip Shape		not existent		
Tang Dimensions		Distance [mm]	Beginning	End
		Width [mm]	16.5	1
		Thickness [mm]	8	5

Table 1: Overview of measured parameters of Object 126.003

l [mm]	b [mm]	d [mm]	A [mm^2]	α [°]	Blade Cross Section
0	35.5	7.7	136.7	24.5	Diamond
100	30.0	6.0	90.0	22.6	Diamond
200	30.0	5.8	87.0	21.9	Diamond
300	26.5	5.7	75.5	24.3	Diamond
400	26.5	5.4	71.6	23.0	Diamond
500	26.0	5.4	70.2	23.5	Diamond
600	23.8	4.5	53.6	21.4	Diamond
700	22.2	4.2	46.6	21.4	Diamond
800	14.5	3.7	32.4	23.9	Diamond
900	14.5	3.2	23.2	24.9	Diamond
1000	6.5	5.0	16.3	75.1	Diamond

Table 2: Blade Parameters of Object 126.003; l ... Blade Length, b ... Blade Width, d ... Blade Thickness, A ... Cross Section Area, α ... Cutting Angle

Object number 126.006 is a hand–and–a–half training sword dated circa 1480. The blade features an interesting mirrored-assymetrical rhomboid cross section. In the half-forte it is formed in a slightly rounded hexagon to allow practising half-sword techniques without risk of injury. The crossguard is of simple rectangular form, the pommel pear-shaped and beveled, the handle is made of wood halfway wrapped with thin leather cord.

Classification according to [Oakeshott, 1991]:

- *Sword Type*: no match
- *Hilt Type*: Type 7
- *Pommel*: Type T5

Figure 11: Object 126.006 – Hilt and Forte

Figure 12: Object 126.006 – Blade

Figure 13: Object 126.006 – Point
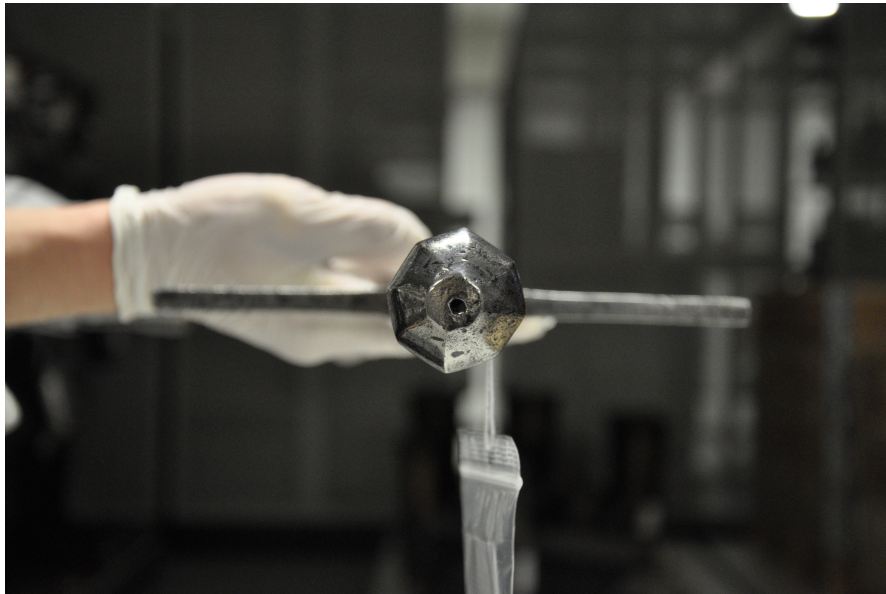
Figure 14: Object 126.006 – Pommel

		126.006			
Overall Length [mm]	a	958			
Overall Weight [g]		1051			
Pommel Length [mm]	b	59			
Grip Length [mm]	c	150			
Quillon Block Thickness [mm]		-			
Ricasso Length [mm]	d	from 185 to 325			
Ricasso Width [mm]		Table 4			
Ricasso Thickness [mm]		Table 4			
Blade Length [mm]	e	1045			
Point of Balance [mm]	f	200			
Pivot Point 1 [mm]	g	545			
Virtual Blade Weight [g]		193			
Pivot Point 2 [mm]		260			
Virtual Crossguard Weight [g]		642			
Blade Presence [%]					
Number of Fullers		1			
Fuller Length [mm]		110			
Fuller Width [mm]		8.5			
Fuller Depth [mm]		1.5			
Distance Grip-Pommel [mm]		-			
Quillon Length [mm]	h	240			
Quillon Thickness [mm]		6x9.4			
Blade Cross Section		Rhomboid; from 185 mm to 325, asymmetric Hexagon			
Quillon Cross Section		Rectangle			
Grip Shape		from hexagon to oval			
Tang Dimensions		Distance [mm]	0.0	72.0	End
		Width [mm]	29.0	22.5	15.0
		Dicke [mm]	23.0	22.0	15.5

Table 3: Overview of measured parameters of Object 126.006

l [mm]	b [mm]	d [mm]	q [mm]	s [mm]	A [mm^2]	α [°]	Blade Cross Section
0	34.8	7.7	23.0	0.0	134.0	27.6	Rhomboid
100	31.3	6.3	20.5	0.0	98.6	25.0	Rhomboid
200	20.0	6.8	16.0	3.9	89.6	0.0	Asym. Hexagon
300	23.1	5.7	15.0	3.9	93.5	0.0	Asym. Hexagon
400	23.4	5.5	15.5	0.0	64.4	29.3	Rhomboid
500	20.2	5.4	12.3	0.0	54.5	31.2	Rhomboid
600	16.6	5.1	11.2	0.0	42.3	38.1	Rhomboid
700	12.9	4.3	8.2	0.0	27.7	39.3	Rhomboid

Table 4: Blade Parameters of Object 126.006; l ... Blade Length, b ... Blade Width, d ... Blade Thickness, q ... big Distance Central Ridge, s ... Edge Thickness, A ... Cross Section Area, α ... Cutting Angle

IV.3.   Object 126.026

The two-handed sword with object number 126.026 has a massive, deeply fullered blade with a rectanglar cross section at the ricasso and then merges into lenticular form. The weapon has been dated to the year 1550. The symmetrical hilt consists of the crossguard and two rings for hand protection on each side. Hilt and pommel are blackened. When doing cuts, the majority of the weight is felt in the middle of the blade due to the quite thick debole.

Classification according to [Oakeshott, 1991] and [Norman, 1980]:

- *Sword Type*: Similar to type XX with four fullers (Oakeshott)
- *Hilt Type*: Type 43, symmetrical (Norman)
- *Pommel*: Type T5 (Oakeshott)

Figure 15: Object 126.026 – Hilt and Forte

Figure 16: Object 126.026 – Hilt
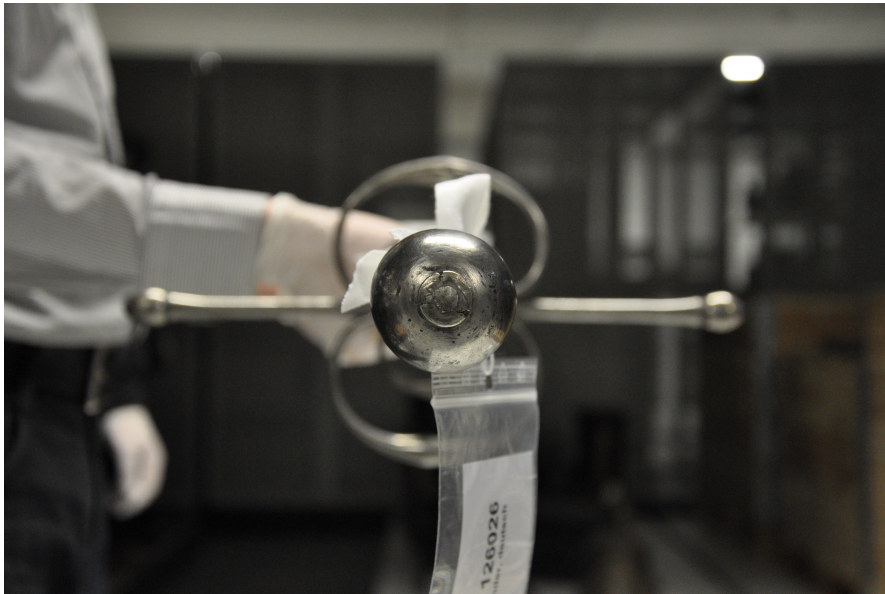

Figure 17: Object 126.026 – Point

Figure 18: Object 126.026 – Pommel

Figure 19: Object 126.026 – Blacksmith's mark

		126.026
Overall Length [mm]	a	1575
Overall Weight [g]		2621
Pommel Length [mm]	b	57
Grip Length [mm]	c	333
Ricasso Length [mm]	d	117
Ricasso Width [mm]		Table 6
Ricasso Thickness [mm]		Table 6
Blade Length [mm]	e	1185
Point of Balance [mm]	f	130
Pivot Point 1 [mm]	g	in or in front of the point
Virtual Blade Weight [g]		-
Pivot Point 2 [mm]		475
Virtual Crossguard Weight [g]		1496
Blade Presence [%]		
Number of Fullers		4
Fuller Length [mm]		outer 2: 95; inner 2: 420
Fuller Width [mm]		Table 6
Fuller Depth [mm]		Table 6
Distance Grip-Pommel [mm]		-
Quillon Length [mm]	h	353
Quillon Thickness [mm]		10x10
Blade Cross Section		Rectangle to 95mm, then Lenticular
Quillon Cross Section		Rund
Grip Shape		oval, bulgy

	Distance [mm]	0.0	160	End
Grip Dimensions	Width [mm]	32.5	37.5	24.5
	Thickness [mm]	21.0	26.5	22.7

Table 5: Overview of measured parameters of Object 126.026

l [mm]	b [mm]	d [mm]	b_K [mm]	t [mm]	Querschnitt [mm^2]	Cutting Angle [°]	Blade Cross Section
0	44.3	7.1	2.0	0.1	313.5	0.0	Rectangle
100	39.0	6.9	7.5	1.2	156.0	40.1	Lenticular
200	38.5	6.4	6.5	1.5	138.1	37.8	Lenticular
300	37.2	6.3	6.5	1.5	130.1	38.4	Lenticular
400	35.5	5.5	5.5	0.5	123.4	35.2	Lenticular
500	33.9	5.2	0.0	0.0	118.1	34.9	Lenticular
600	33.0	4.9	0.0	0.0	108.3	33.8	Lenticular
700	32.4	4.6	0.0	0.0	99.8	32.3	Lenticular
800	30.6	4.2	0.0	0.0	86.0	31.3	Lenticular
900	29.1	3.8	0.0	0.0	74.0	29.8	Lenticular
1000	27.5	3.8	0.0	0.0	69.9	31.5	Lenticular
1100	26.1	3.5	0.0	0.0	61.1	30.6	Lenticular

Table 6: Blade Parameters of Object 126.026; l ... Blade Length, b ... Blade Width, d ... Blade Thickness, b_K ... Fuller Width, t ... Fuller Depth, A ... Cross Section Area, α ... Cutting Angle

Object 161.378 is a two–handed sword from the middle of the 16th century. It has a broad but very thin blade of lenticular form, which can even be bent by hand in the forte. The hilt consists of a crossguard with spherical points and two symmetrical side rings for hand protection. Hilt and pommel are blackened. Despite the weight of 2820 g handling is swift and definitely suited for fencing techniques. The felt weight is in the strong part of the blade and cuts can be stopped effortlessly.

Classification according to [Oakeshott, 1991] and [Norman, 1980]:

- *Sword Type*: Type XIIa (Oakeshott)
- *Hilt Type*: Type 10, symmetrical (Norman)
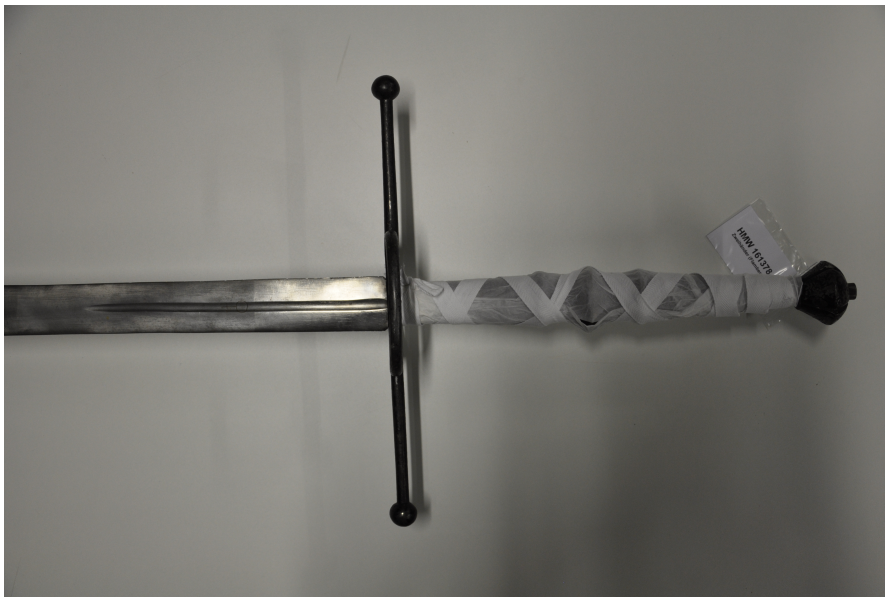- *Pommel*: Type T5 (Oakeshott)

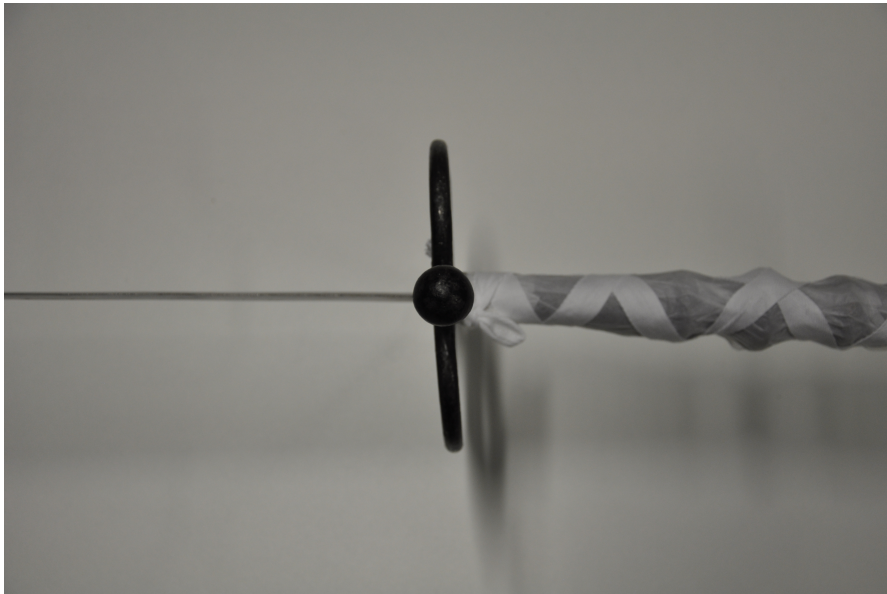*Figure 20: Object 161.378 – Hilt and Forte*

Figure 21: Object 161.378 – Hilt and Forte, sideways

Figure 22: Object 161.378 – Point

Figure 23: Object 161.378 – Pommel

		161.378						
Overall Length [mm]	a	1575						
Overall Weight [g]		2820						
Pommel Length [mm]	b	57						
Grip Length [mm]	c	360						
Quillon Block Thickness [mm]		12						
Ricasso Length [mm]	d	-						
Ricasso Width [mm]		-						
Ricasso Thickness [mm]		-						
Blade Length [mm]	e	1160						
Point of Balance [mm]	f	85						
Pivot Point 1 [mm]	g	in or in front of the point						
Virtual Blade Weight [g]		-						
Pivot Point 2 [mm]		355						
Virtual Crossguard Weight [g]		1748						
Blade Presence [%]								
Number of Fullers		1						
Fuller Length [mm]		280						
Fuller Width [mm]		9						
Fuller Depth [mm]		1.2						
Distance Grip-Pommel [mm]		-						
Quillon Length [mm]	h	420						
Quillon Thickness [mm]		11.5						
Blade Cross Section		Lenticular						
Quillon Cross Section		Round						
Grip Shape		oval, with 3 bulges						
Grip Dimensions		Distance [mm]	0.0	125	145	170	190	215	End
		Width [mm]	36.0	50.0	38.5	59.0	39.0	50.0	25.5
		Thickness [mm]	25.0	38.0	28.0	47.0	29.0	40.0	22.0

Table 7: Overview of measured parameters of Object 161.378

l [mm]	b [mm]	d [mm]	A [mm^2]	α [°]	Blade Cross Section
0	50.8	6.5	206.3	29.2	Lenticular
100	49.5	5.3	160.7	24.4	Lenticular
200	47.7	4.4	125.6	21.1	Lenticular
300	46.5	4.3	133.5	21.1	Lenticular
400	47.2	4.2	132.4	20.3	Lenticular
500	46.3	3.9	120.6	19.3	Lenticular
600	44.9	3.8	113.9	19.4	Lenticular
700	45.4	3.5	106.0	17.6	Lenticular
800	44.5	3.2	95.0	16.5	Lenticular
900	43.2	2.5	72.0	13.2	Lenticular
1000	41.7	2.2	61.2	12.1	Lenticular
1100	37.5	2.0	50.0	12.2	Lenticular

Table 8: Blade Parameters of Object 161.378; l ... Blade Length, b ... Blade Width, d ... Blade Thickness, A ... Cross Section Area, α ... Cutting Angle

IV.5. Object 161.381

The two–handed sword 161.381is similar to the previously described in dimensions and form, though the weight is lower by 205 g and the blade is even thinner end more flexible. The weight is subjectively felt in the crossguard and therefore cuts can be stopped or redirected easily.

Classification according to [Oakeshott, 1991] and [Norman, 1980]:

- *Sword Type*: Type XIIa (Oakeshott)
- *Hilt Type*: Type 10, symmetrical (Norman)
- *Pommel*: Type T5 (Oakeshott)

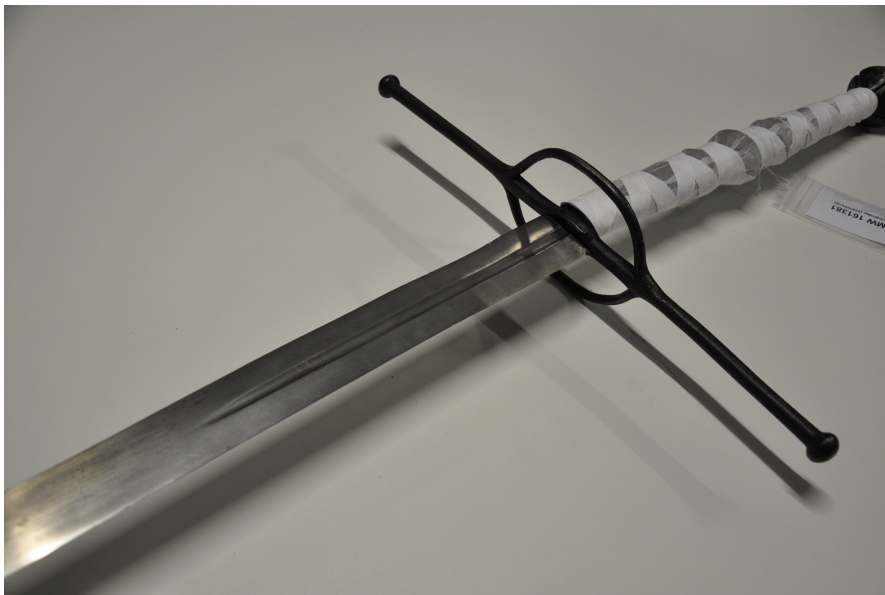*Figure 24: Object 161.381 – Hilt and Forte*

Figure 25: Object 161.381 – Hilt and Forte

Figure 26: Object 161.381 – Point

Figure 27: Object 161.381 – Pommel

		161.381						
Overall Length [mm]	a	1615							
Overall Weight [g]		2615							
Pommel Length [mm]	b	51							
Grip Length [mm]	c	403							
Quillon Block Thickness [mm]		14							
Ricasso Length [mm]	d	-							
Ricasso Width [mm]		-							
Ricasso Thickness [mm]		-							
Blade Length [mm]	e	1163							
Point of Balance [mm]	f	34							
Pivot Point 1 [mm]	g	in or in front of the point							
Virtual Blade Weight [g]		-							
Pivot Point 2 [mm]		233							
Virtual Crossguard Weight [g]		1813							
Blade Presence [%]									
Number of Fullers		1							
Fuller Length [mm]		295							
Fuller Width [mm]		9.5							
Fuller Depth [mm]		1.4							
Distance Grip-Pommel [mm]		-							
Quillon Length [mm]	h	487							
Quillon Thickness [mm]		12							
Blade Cross Section		Lenticular							
Quillon Cross Section		Rund							
Grip Shape		oval, with 3 bulges							
	Distance [mm]	0.0	145	163	195	225	250	End
Grip Dimensions	Width [mm]	34.0	43.0	36.0	50.0	36.0	44.0	27.0
	Thickness [mm]	22.0	33.0	26.5	43.0	27.0	37.5	24.0

Table 9: Overview of measured parameters of Object 161.381

l [mm]	b [mm]	d [mm]	A [mm^2]	α [°]	Blade Cross Section
0	51.5	5.5	171.2	24.4	Lenticular
100	47.8	4.1	112.8	19.6	Lenticular
200	48.0	4.1	113.4	19.5	Lenticular
300	47.7	4.1	130.6	19.7	Lenticular
400	46.7	3.7	115.3	18.1	Lenticular
500	45.5	3.3	100.2	16.6	Lenticular
600	44.1	3.1	91.2	16.1	Lenticular
700	44.7	3.2	95.5	16.4	Lenticular
800	44.1	2.7	79.4	14.0	Lenticular
900	43.5	2.5	72.5	13.2	Lenticular
1000	41.9	2.2	61.5	12.0	Lenticular
1100	38.7	1.8	46.5	10.7	Lenticular

Table 10: Blade Parameters of Object 161.381; l ... Blade Length, b ... Blade Width, d ... Blade Thickness, A ... Cross Section Area, α ... Cutting Angle

The weapon number 161.888 is a sidesword with a diamond shaped, strongly tapered blade from the first half of the 17th century. The ricasso is broad, quite thick and doubly fullered. The oval handle has spiral grooves and is wrapped with wire. A fishtail shaped pommel completes the hilt. The handling is point heavy, yet still well suited for quick cuts.

Classification according to [Norman, 1980]:

- *Hilt*: Type 25
- *Inner Guard*: Type 11
- *Pommel*: Type 40

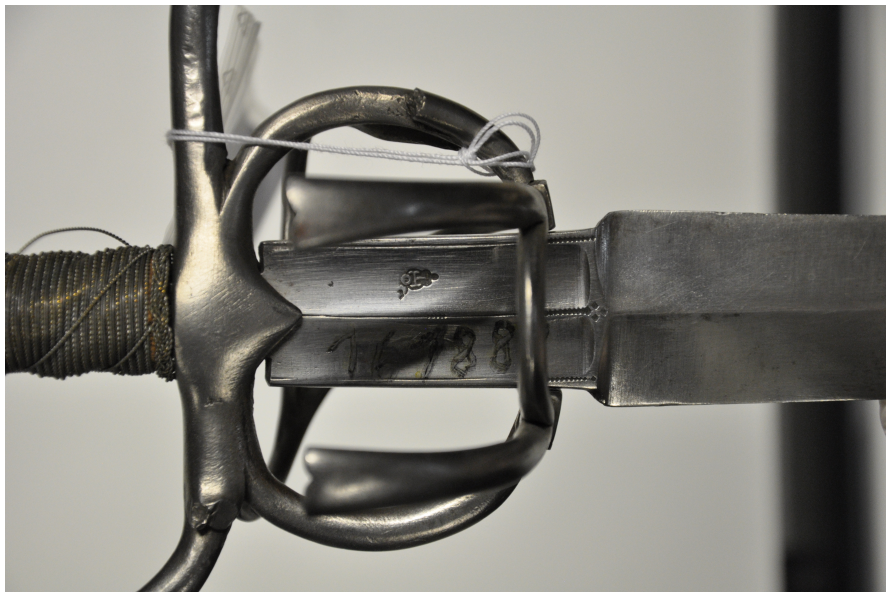*Figure 28: Object 161.888 – Hilt and Forte*
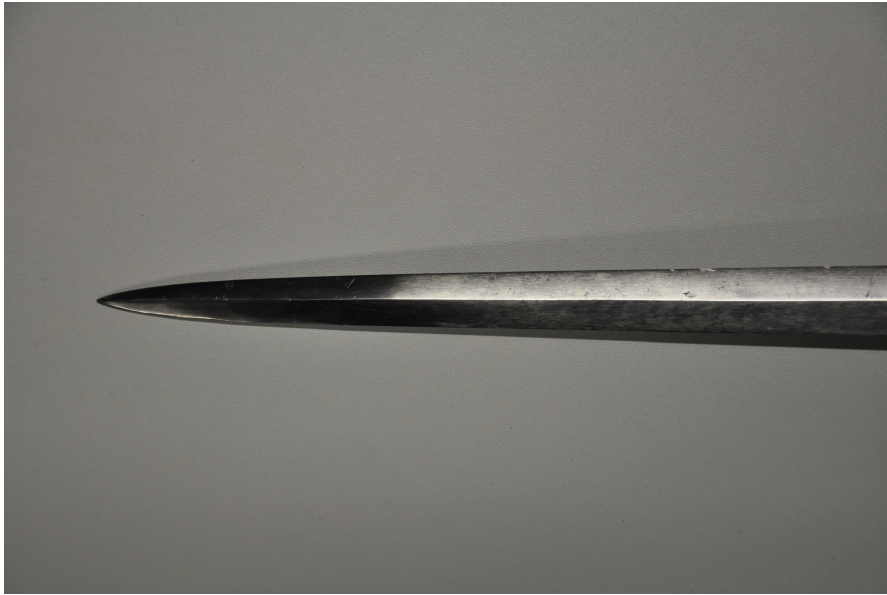

Figure 29: Object 161.888 – Ricasso

Figure 30: Object 161.888 – Point

Figure 31: Object 161.888 – Pommel

		161.888		
Overall Length [mm]	a	1020		
Overall Weight [g]		1137		
Pommel Length [mm]	b	56		
Grip Length [mm]	c	83		
Quillon Block Thickness [mm]		-		
Ricasso Length [mm]	d	78		
Ricasso Width [mm]		Front: 29.7; Back: 27.5		
Ricasso Thickness [mm]		7		
Blade Length [mm]	e	877		
Point of Balance [mm]	f	155		
Pivot Point 1 [mm]	g	535		
Virtual Blade Weight [g]		309		
Pivot Point 2 [mm]		325		
Virtual Crossguard Weight [g]		662		
Blade Presence [%]				
Number of Fullers		2		
Fuller Length [mm]		from 0 to 78		
Fuller Width [mm]		12.1		
Fuller Depth [mm]		1		
Distance Grip-Pommel [mm]		-		
Quillon Length [mm]	h	170		
Quillon Thickness [mm]		9x6		
Blade Cross Section		Diamond		
Quillon Cross Section		Oval, flattened		
Grip Shape		Oval, coiled		
Grip Dimensions		Distance [mm]	0.0	83
		Width [mm]	25.0	19.0
		Thickness [mm]	19.5	16.5

Table 11: Overview of measured parameters of Object 161.888

l [mm]	b [mm]	d [mm]	A [mm^2]	α [°]	Blade Cross Section
0	27.5	7.0	160.1	0.0	Rectangle
78	37.2	7.5	139.5	22.8	Diamond
178	32.6	6.3	102.7	21.9	Diamond
278	29.7	5.6	83.2	21.4	Diamond
378	27.2	5.5	74.8	22.9	Diamond
478	25.4	5.2	66.0	23.1	Diamond
578	23.3	5.2	60.6	25.2	Diamond
678	20.7	4.7	48.6	25.6	Diamond
778	16.9	4.2	35.5	27.9	Diamond
828	14.0	3.9	27.3	31.1	Diamond

Table 12: Blade Parameters of Object 161.888; l ... Blade Length, b ... Blade Width, d ... Blade Thickness, A ... Cross Section Area, α ... Cutting Angle

IV.7. OBJECT 161.890

The sidesword with object number 161.890 is similar to the aforementioned, yet the blade of this tapers more in thickness. The ricasso is also narrower and has only one fuller. The handle is missing. Handling is excellent, the subjectively felt weight is in the forte and therefore this sword is agile and quick in cuts and parries.

Classification according to [Norman, 1980]:

- *Hilt*: Type 25
- *Inner Guard*: Type 11
- *Pommel*: Type 40

Figure 32: Object 161.890 – Hilt and Forte
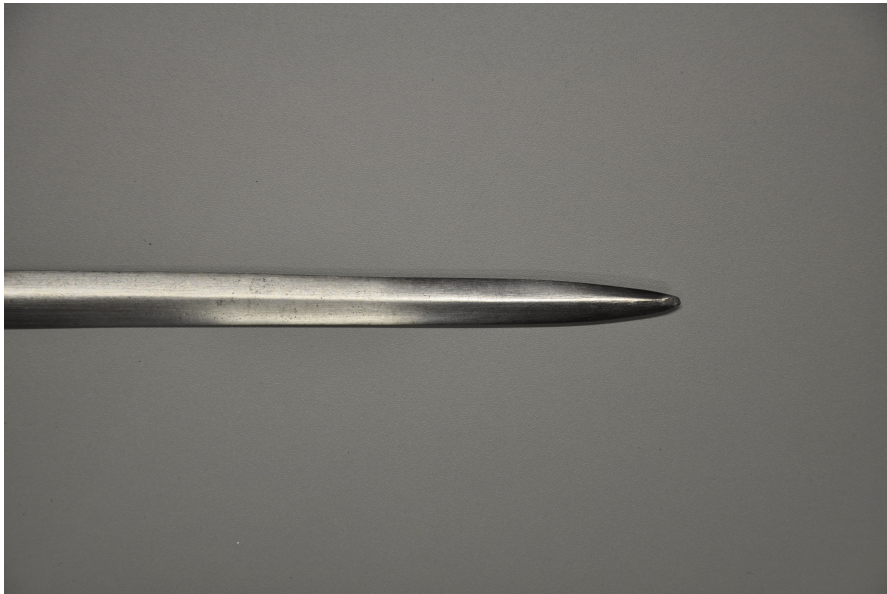

Figure 33: Object 161.890 – Hilt and Forte

Figure 34: Object 161.890 – Point

Figure 35: Object 161.890 – Pommel

		161.890	
Overall Length [mm]	a	1100	
Overall Weight [g]		1140	
Pommel Length [mm]	b	61	
Grip Length [mm]	c	75	
Quillon Block Thickness [mm]		-	
Ricasso Length [mm]	d	75	
Ricasso Width [mm]		Front: 27.5; Back: 22.5	
Ricasso Thickness [mm]		7.3	
Blade Length [mm]	e	955	
Point of Balance [mm]	f	130	
Pivot Point 1 [mm]	g	705	
Virtual Blade Weight [g]		210	
Pivot Point 2 [mm]		360	
Virtual Crossguard Weight [g]		567	
Blade Presence [%]			
Number of Fullers		1	
Fuller Length [mm]		from 0 to 75	
Fuller Width [mm]		17.5	
Fuller Depth [mm]		2.5	
Distance Grip-Pommel [mm]		-	
Quillon Length [mm]	h	170	
Quillon Thickness [mm]		6x9	
Blade Cross Section		Diamond	
Quillon Cross Section		Oval, flattened	
Grip Shape		not existent	
Tang Dimensions	Distance [mm]	0.0	83
	Width [mm]	13.5	8.6
	Thickness [mm]	7.7	5.7

Table 13: Overview of measured parameters of Object 161.890

l [mm]	b [mm]	d [mm]	A [mm^2]	α [°]	Blade Cross Section
0	22.5	7.3	105.0	0.0	Rectangle
75	36.4	7.2	131.0	22.4	Diamond
175	31.0	4.7	72.9	17.2	Diamond
275	28.2	4.3	60.6	17.3	Diamond
375	27.5	4.3	59.1	17.8	Diamond
475	24.8	4.3	53.3	19.7	Diamond
575	21.5	3.8	40.9	20.0	Diamond
675	19.7	3.8	37.4	21.8	Diamond
775	17.1	3.4	29.1	22.5	Diamond
875	14.9	3.0	22.4	22.8	Diamond
925	11.3	2.7	15.3	26.9	Diamond

Table 14: Blade Parameters of Object 161.890; l ... Blade Length, b ... Blade Width, d ... Blade Thickness, A ... Cross Section Area, α ... Cutting Angle

V. Discussion

In figure 38 blade width versus standardised distance from crossguard is diagramed for each object. Object 161.378 and 161.381 show a similar progression of blade width. Object 126.026 shows a linear taper of blade width with a sharp bend in the curve at 10% of its blade length. Objects 126.003, 126.006, 161.888 and 161.890 display a similar blade width curve with mostly diamond shaped cross sections. Object 126.006 has a hexagonal cross section between 20% and 50% of its length. Because handling is directly connected to the taper of cross section, a change of cross section from diamond to hexagonal shape must entail an abrupt change of thickness or width. Here the change occurs in width. Objects 161.888 and 161.890 have a rectangular cross section in the blade origin and taper toward the crossguard to a narrow width to fit through the hilt. This explains the odd looking curve in that area.

Blade cross sections versus standardised distance from crossguard are diagramed in figure 37. As expected, two–handed swords exhibit the biggest cross sections. Object 126.026 has the largest cross section in the blade origin. From there it tapers strongly and shows a similar progression as the other two–handers (Object 161.378 and 161.381). Because of the standardisation of cross sections in the blade origin, different weapons can be compared as shown in figure 39. It shows that, for most edged wepaons, the blade cross section reduces right after blade origin. Exceptions are objects 161.888 and 161.890, because they have tapered ricassi.

Another interesting set of data is the bevel or edge angle, displayed in figure 40. All measured swords exhibit a bevel angle of 30° or less in the third closest to the point. Except object 126.003, where the point is shaped like a bodkin or spike. To achieve such small bevel angles with a lenticular blade shape and a favourable cross section progression, the blade needs to be wide because with a narrow lenticular blade a tiny change in thickness results in a drastic change of bevel angle. Diamond shaped blades can achieve such bevel angles and cross section progressions with less width.
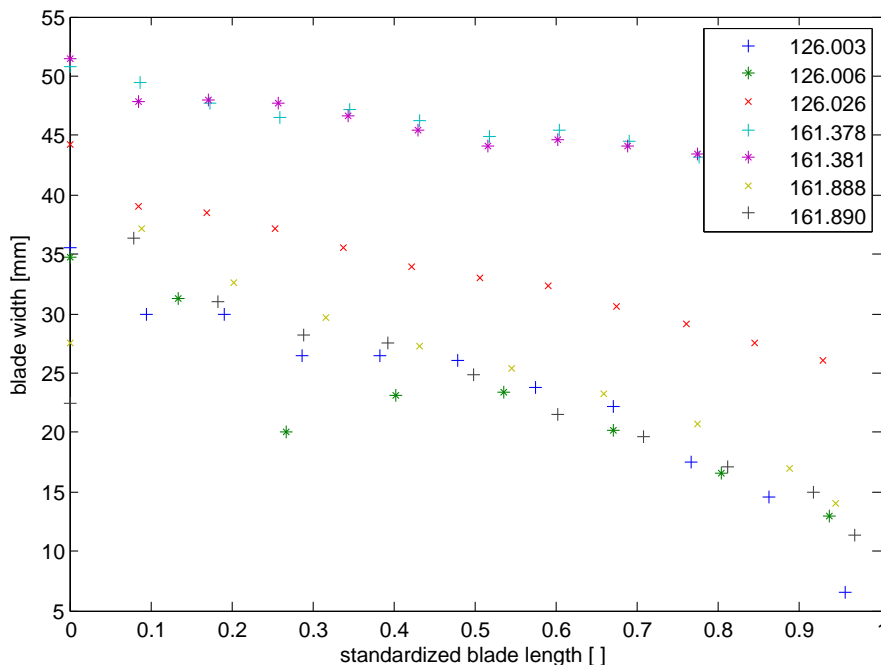

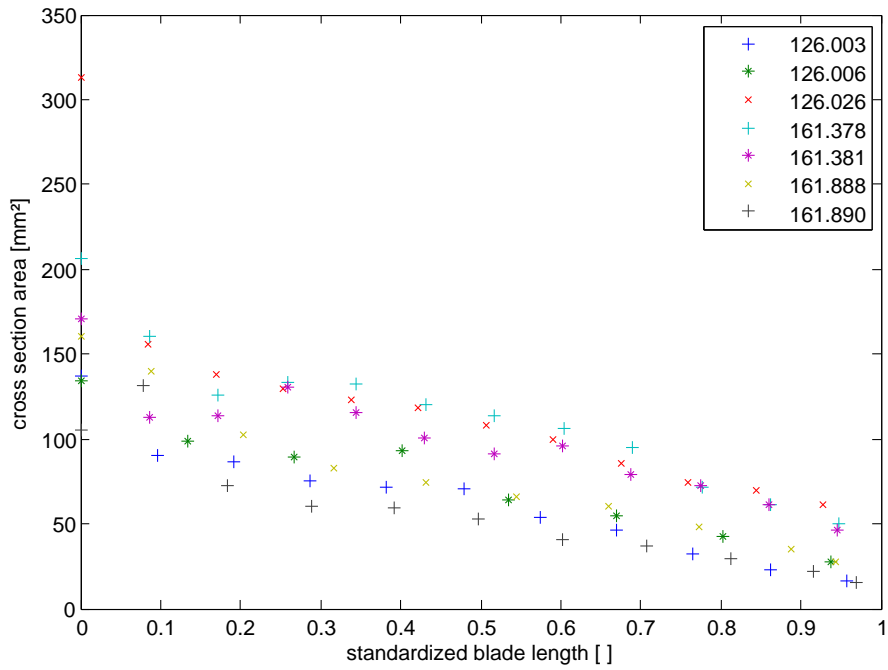*Figure 36: Blade width versus standardised blade length of all objects.*

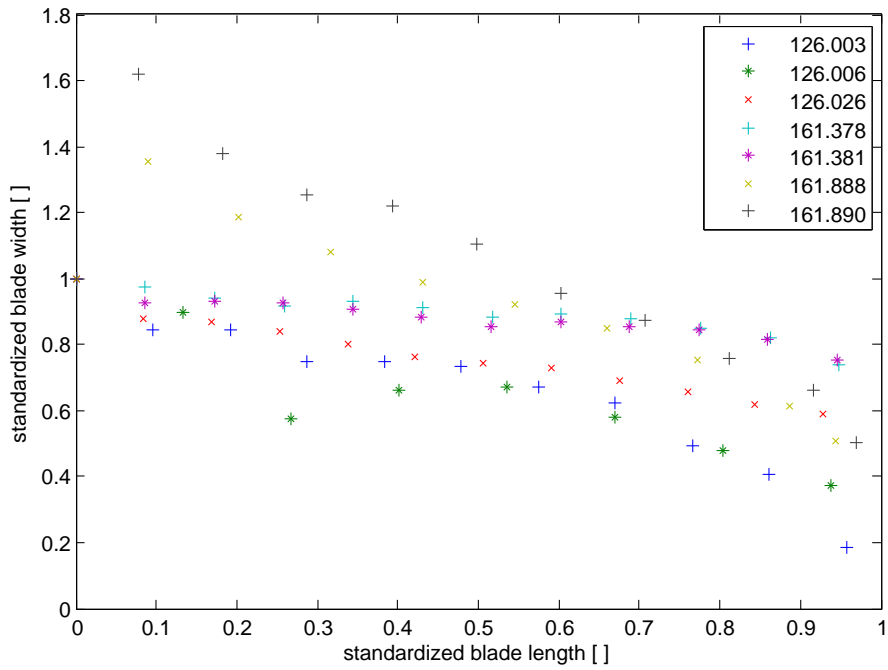*Figure 37: Cross section versus standardised blade length of all objects.*

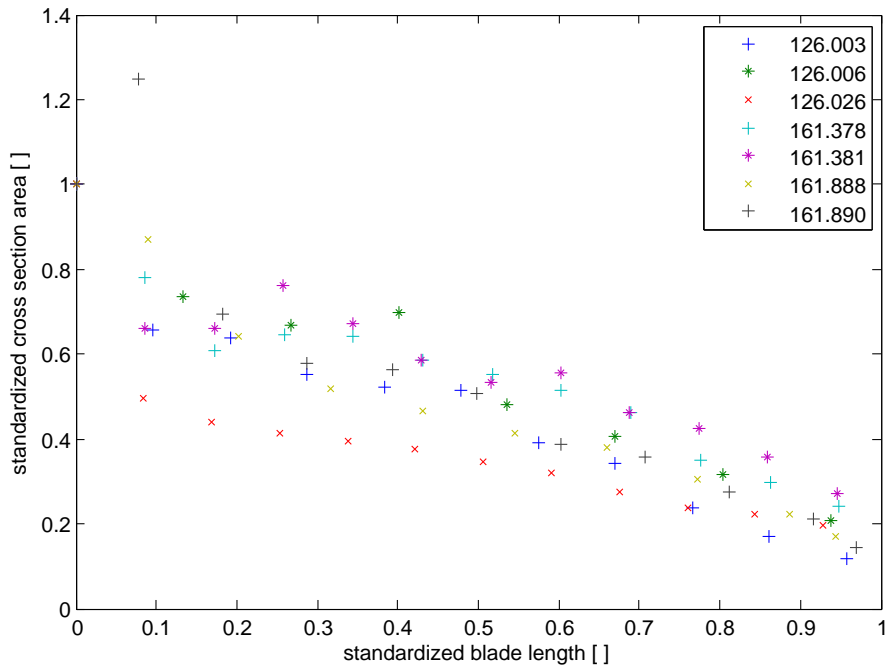*Figure 38: Standardised blade width versus standardised blade length of all objects.*

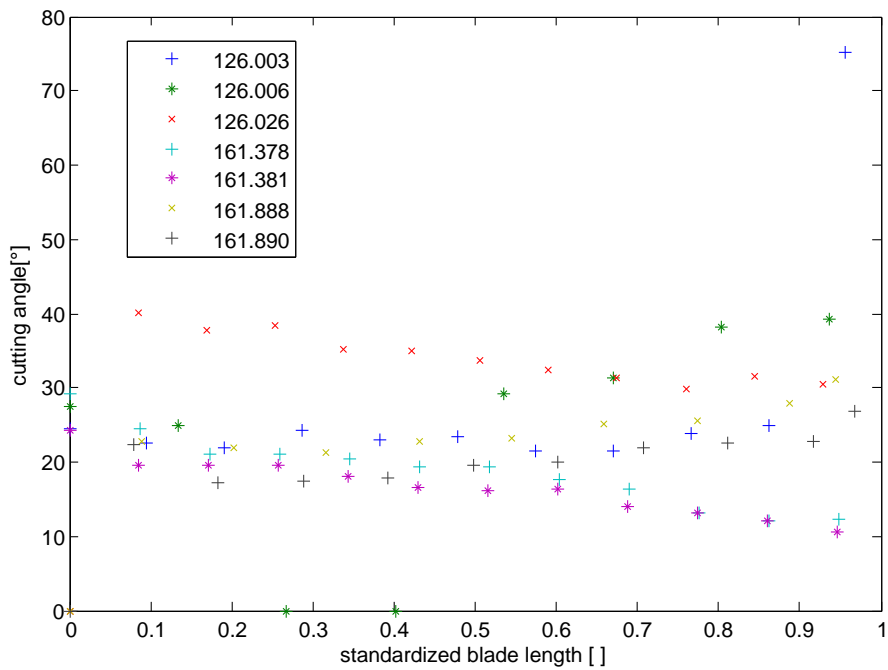*Figure 39: Standardised cross section versus standardised blade length of all objects.*

Figure 40: Bevel angle versus standardised blade length of all objects.

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