Artigiano

Mission Statement

"We at Artigiano aim to promote culinary creativity through innovative and timeless kitchenware design. Artigiano products use quality materials and unique form and flare, to create tools that raise your gastronomic experience to a whole new level. We help you create your masterpiece on a plate..."

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Design Brief

"Iron rusts from disuse, stagnant water loses its purity and in cold weather becomes frozen; even so does inaction sap the vigors of the mind."

— Leonardo Da Vinci

Artigiano

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1600 Holloway Avenue San Francisco, CA 94132 USA • (415) 338-1111 • grossjamess@gmail.com

Project description

The project is called Signature. It is one of many tools for the culinary craftsman offered by Artigiano. The Signature product provides an intuitive tool for the user to apply an artistic sauce flourish to their plate, immediately prior to serving. This is deregure in the finest restaurants, and something the aspiring gastronomique will want to emulate at home.

At Artigiano, fine detail is the core of what we are about. Our mission in the marketplace is to provide our target market with the products that are not available from any other kitchenware company. Our products add that last iota of polish to the enthusiast's dining experience. We never intend to me a "me too" company, producing just another knife, or utensil. Our attention to detail, use of materials, and relationship with our end users is what sets us apart.

Project Background, and Aims

This project came about as a result of the realization that as we all age and retire, there will be a growing segment of the professional population that will now have the financial wherewithal to pursue cooking and entertaining to higher level. Their children have now grown up and have left for university, so these so called "empty nesters" now have more time as well to devote to their own interests, and passions. Shows like "Come Dine with Me" are now tapping into this market segment. These people want to entertain, and also want to be seen as having the best in kitchen products by their friends and family, creating a buzz about the latest cooking accessories. We intend to exploit this word-of-mouth buzz to promote our products via events, culinary courses, and an online presence, as well as a possible bricks-and-mortar presence.

Market

As will be described in greater detail in the branding section, our products have a specific audience in mind. Our products will have an appeal to aspiring university educated amateur chefs, both male and female, of a target age group of approximately 45 to 65. This demographic is a portion of what in the United States of America calls the "Baby Boomers". What also sets these people apart will also be a certain level of financial wherewithal, and an interest in the finer things. Whether it's automobiles, clothes, watches, or other accoutrements, they appreciate, and can afford the best. This particular demographic is also sometimes referred to as Whoopies (well heeled older people). Catering to this clientele enable us to ask the premium price required to cover the cost of manufacturing a product of high quality materials, and providing a level of fit-and-finish that speaks the name: "Artigiano".

Our aesthetic sensibilities currently draws influence from Western cultures, with more appeal to Europe, and U.S. tastes, but our future development roadmap includes products that will have global appeal as well.

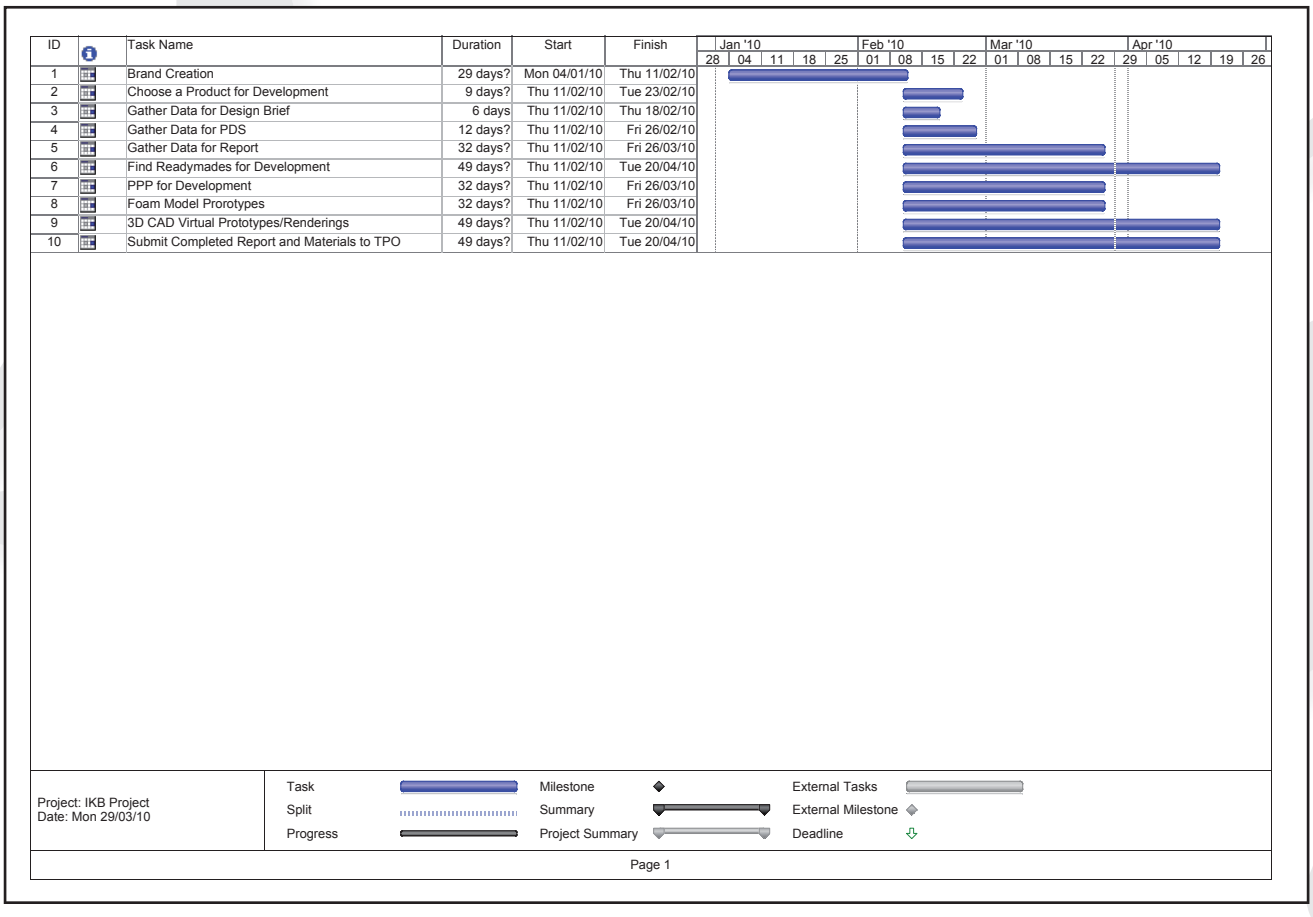
Artigiano

Product Production

The design of the product, and the processes utilized to manufacture it would make the potential production quantities limited only by the demand for the product. The production processes required to produce this product are: blow moulding, injection moulding (the main Signature item, and work stand), and sheetmetal forming, and plating (the sauce vessels).

Project Gantt Chart

Shown below, is the Artigiano project schedule. All important project items are shown, with starting and due dates. This is version 1.0. To this point, there have been no changes to the product schedule. This Gantt chart was created in MS Project.



ID	Task Name	Duration	Start	Finish
1	Brand Creation	29 days?	Mon 04/01/10	Thu 11/02/10
2	Choose a Product for Development	9 days?	Thu 11/02/10	Tue 23/02/10
3	Gather Data for Design Brief	6 days	Thu 11/02/10	Thu 18/02/10
4	Gather Data for PDS	12 days?	Thu 11/02/10	Fri 26/02/10
5	Gather Data for Report	32 days?	Thu 11/02/10	Fri 26/03/10
6	Find Readymades for Development	49 days?	Thu 11/02/10	Tue 20/04/10
7	PPP for Development	32 days?	Thu 11/02/10	Fri 26/03/10
8	Foam Model Prorotypes	32 days?	Thu 11/02/10	Fri 26/03/10
9	3D CAD Virtual Prototypes/Renderings	49 days?	Thu 11/02/10	Tue 20/04/10
10	Submit Completed Report and Materials to TPO	49 days?	Thu 11/02/10	Tue 20/04/10

"Every revolutionary idea seems to evoke three stages of reaction. They may be summed up by the phrases: (1) It's completely impossible. (2) It's possible, but it's not worth doing. (3) I said it was a good idea all along."

— Arthur C. Clarke

Artigiano

The Product's Performance

The Artigiano Signature is a hand-held sauce dispensing utensil, with a sauce dispensing capability of approximately five (5) applications (150 ml) to the average dinner plate per filling of sauce from the sauce vessel. Filling of sauce into the utensil will be accomplished by pulling the filling plunger outward once while the dispensing tip is inserted into the sauce. Dispensing occurs as the body of the utensil is squeezed by the thumb, and index finger. The flow rate of the sauce dispensed is controlled by the pressure exerted on the utensil's body.

Accessory dispensing tips with different nozzle shapes and orifices will be available to create a range of "writing" line shapes. This would be analogous to the selection of the nib shape of a calligraphers pen, or the selection of a line drawing brush shape in a drawing program such as Adobe Illustrator.

All items described will be washable by hand, or in the typical domestic dishwasher. Temperature and chemical specifications for dishwasher cleaning will be described in more detail in the "Product Cleaning Requirements" section of this PDS.

Environmental Considerations

User

Ambient Temperature range: 5° C to 32° C.

Relative Humidity Range: < 80%.

Vibration: N/A

Ambient Noise Sensitivity: N/A

Shipping

Ambient Temperature range: 5° C to 32° C.

Relative Humidity Range: < 90 %.

Shock and Impact: Not to exceed 100g, Per ASTM D3332.

Ambient Noise Sensitivity: N/A

Dirt and Contamination: Compliant to BS6001-1, ISO 2859-1 or ANSI/ASQZC 1.4-1993.

Packaging Considerations

Product Display Carton

Products per carton: 1.

Material and Printing:

Recycled Cardboard, min. 40% PCW.

Water soluble inks, two PMS colours.

Product Shipping Carton

Display Cartons Per Shipping Carton: 80.

Shipping Cartons Per Pallet: 960.

Material and Printing:

Recycled Cardboard, min. 70% PCW.

Water soluble inks, black colour.

Typical Units Per Shipping 20' Container: 9,600.

Max. Duration in a Shipping Container: 20 Days.

POS Display Considerations

Artigiano products will be displayed in their individual cartons on shelves, grouped with other products in the Artigiano range when possible, and appropriate. POS signage bearing the Artigiano logo artwork not supplied by Artigiano requires approval before being displayed. Electronic proofs (.pdf files) of such signage are sufficient for approval.

POS Display Considerations (cont.)

Ambient Temperature range: 5° C to 32° C.
Relative Humidity Range: 20% to 90%.

Product Cleaning Requirements.

Note: This product is not intended for commercial use, nor is it intended to withstand commercial cleaning methods, or chemicals. No claims of the appropriateness for commercial use are stated, or implied.

Cleaning, Non-commercial Dishwasher

Temperature

Typical dishwasher temp. range: 55° C to 65° C.

Chemicals

Only commercially available dish washing and rinse aid products are to be used.

Cleaning, Non-commercial Hand Washing

Temperature

Typical dishwasher temp. range: 37° C to 43° C.

Chemicals

Only commercially available dish washing products are to be used.

Abrasions

Only soft cleaning cloths or sponges are to be used for cleaning this product. Do not use abrasive scouring pads or brushes.

Product Service Life

This product is suitable for daily domestic use, and will provide a long service life of approximately five (5) years if used, and maintained, in the manner stated in the user guide. Daily domestic use is defined as:

- Used in the preparation of 1-3 meals.
- Cleaned in the prescribed manner 1-3 times.
- Stored as prescribed in the user guide after cleaning.

Predicted Commercial Product Life Span for the Signature Product

The first sentence of the Artigiano mission statement is: "We at Artigiano aim to promote culinary creativity through innovative and timeless kitchenware design". Our intention is to produce a nuovo classico, a new classic, with every one of our product designs. That being said, the market and consumer is fickle, and tastes move on. The intention is to produce a new product for approximately ten years. If this goal is achieved, there is a high probability of recouping the cost of development, and seeing a healthy ROI from the manufacture of the Artigiano Signature product. We also intend to introduce companion products, and find innovative ways to re-market products to give them additional life as the product matures.

Cost of Manufacture

The greatest percentage of the initial cost of producing the Artigiano Signature will be the tooling for the injection moulding for the tips, the TPE outer moulding and the plunger, the blow moulding for the inner sauce containment structure of the main utensil body. The estimated costs of the moulds are:

Tip #1:	£3,012 (8 cavity).
Tip #2:	£3,012 (8 cavity).
Main body:	£TBD.
Plunger:	£4,167 (8 cavity).

Component cost, per unit:

Tip #1:	£0.21.
Tip #2:	£0.21.
Main body:	£TBD.
Plunger:	£0.31.

Manufacturing overhead:

Per Unit:	£TBD.

Estimated RRSP

We are positioning our products in a luxury market, so lowest pricing of the product is not the highest priority. We will employ value optimized pricing, or setting a RRSP based on the perceived value of the product to the customer, rather that a price strictly derived from a multiple of the manufacturing cost. This does not mean that we can price the product at any point that we wish, and that profit margin is not an issue. Careful study of comparable products produced by our competitors is a key reality check, and this market study should be updated on a regular basis to ensure we are competitive. The flip side of this is careful cost management. Smart decisions regarding manufacturers, whether they be offshore, or onshore, will keep the cost per unit manageable. Vigilant management of product quality will go hand-in-hand with this, focusing on a key tenets of the Artigiano brand, final product quality. Without that, the Signature is not "Artigiano".

Estimated RRSP:	£29.95.

Manufacturing Volume

The estimated capacity of a 20' shipping container is 9600 Signature units. Rounding this quantity up to account for QA rejects, and other shrinkages, the production batch will be approximately 10K units. This would be adjusted seasonally, to satisfy increased demands for the holidays, and reduced for other times of the year when demand softens.

Company Manufacturing

No "exotic" materials or processes are required for the manufacture of the Signature product. Our primary driver for picking a supplier to produce the product will be product quality. Of course, other factors such as pricing, logistics, and reliability will also be considered.

Weight and Size

The Signature product is a small, hand-held utensil that should have no special shipping requirements due to its dimensions, or its weight.

Ergonomics

As will be discussed in greater detail in the Ergonomics section of this report, cognitive and physical ergonomic factors have been considered in the design of the Signature product.

Quality and Reliability

As stated in the "Product Service Life" section of this PDS, under the conditions of "daily domestic use" as described in the PSL section, the useful product life of the Signature is estimated at approximately five (5) calendar years. This estimate assumes that the user is performing the required maintenance as described in the user manual. Areas of possible early failure:

Main body, nozzle fixing tips: Possible shearing off due to over tightening of the accessory nozzle tips is possible. Product should still operate, but leakage may occur between the body and the nozzle tip. This is not repairable, and would end the useful life of the product.

Plunger: Loss or accidental damage to the plunger will render the Signature product unusable. Replacements will be available.
Note: Neither of these failure modes will cause the Signature product to pose a potential safety hazard to the user.

Standards and Specifications

Relevant BS, ISO, EC, ANSI/ASQZC, and FDA standards are referred to in this report as applicable.

Legal Declarations

This product is not intended for any use other than the intended function that it was designed for. Artigiano will not be held liable for any accidents, injuries, or deaths that occur as a result of this product being used in a manner not specifically described in the user guide. No claims of the appropriateness for uses other that noted in the user guide are stated, or implied.

This product is not intended for commercial use, nor is it intended to withstand commercial cleaning methods, or chemicals. No claims of the appropriateness for commercial use are stated, or implied.

End of Life Considerations

The component parts of this product, with the exception of the plated nozzle tips, are produced of recyclable plastics. Further materials development is in process to make the Signature product 100% recyclable.

Development

"I believe that quality level is determined primarily by the actual design of the product itself, not by quality control in the production process."

— Hideo Sugiura, Chairperson (retired),
Honda Motor Company

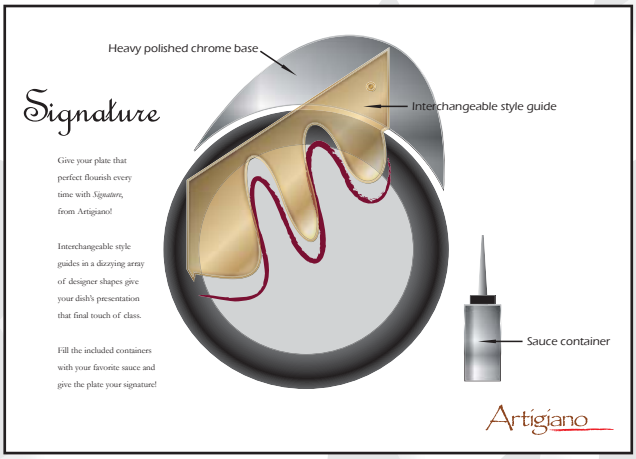
Development of the Signature Product

Something you may have been introduced to whilst dining at a finer restaurant, or viewing a television program such as Masterchef, is the great care that is taken in the final presentation of a plate of food before it is served. This meticulously crafted composition must be as pleasing to the eye as it is to the palette, as the examples below illustrate.

This is where the aspiring home chef's creations often fall short. Pleasing to the palette certainly, but missing that bit of presentation panache that separates this amateur presentation from the professional one.

The Original Signature Concept

In keeping with the Artigiano range of products, Signature was to be a tool to help that amateur home chef with taking his, or her presentation to the next level. The function of the Signature product is to add the final flourish of sauce that decorates and flavours a dish as it is being served. Included below is an illustration / adcept that described a tool that included a template system that would guide the user in drawing an attractive pattern on the plate. It was pointed out, that this level of home chef might consider this unnecessary, and would insist on creating all of their patterns with their own hand. This feedback was taken on board, and the definition of the product was revised.



The Final Signature Concept

The current Signature product discards the template idea, and instead is an attractive, comfortable, ergonomically designed "sauce pen", that the user can use to draw their creative sauce flourishes (their "signature") on their plates as easy as writing on a piece of paper. Integral to the design, is a work

stand for three utensils, and three sauce vessels for containing the sauces that are to be dispensed. All of these pieces will be made of quality, durable materials that will be attractive, and easy to maintain as well. The next step is to decide on what form it will take.

Development of the Signature Form and Function

This product is something that dispenses a fluid in a controlled manner, and is hand-held, so existing products of similar function, wether or not they were a kitchen or food product, were researched. Here are some readymade examples considered for their functionality:

The first item is a common utility lubricating oil can. It is purely functional, with little or no thought to aesthetics, or ergonomics. The second item is an olive oil pitcher, visually appealing design, but no method for controlling the flow of liquid. I came upon the third example quite by accident while shopping at a Wilkinson retail store. The "Tipp-Ex Shake n Squeeze Correction Pen" has a very cleaver feature that I utilize in the final Signature design. While the user grips the pen in a normal fashion, the amount of correction fluid applied is controlled by the amount of thumb and index finger pressure exerted on the body. The flexible "bulge" in the plastic body of the pen is the main moving part, and it works quite effectively. It also feels very comfortable in the hand.

Fourth on the list is another interesting product I discovered in Wilkinson called the "Pritt Power Gel Multipurpose Liquid Gel 2 In 1 Application" (yes, that's what they call it). I liked its ergonomic shape, but it had two other features that were far more relevant to my product research. The product has an adjustable applicator for dispensing either a thin or wide line of adhesive. This seemed like an interesting feature to ad to the Signature's capabilities. The other was a base that the applicator snaps into when not in use, keeping the glue tip protected, and keeping the glue from spilling on to your work surface. Both of these concepts could be applied to the product.

Lastly, I discovered an interesting device called the "Cuisipro Food Decorating Icing Pen". This product has the final element of functionality I needed for the Signature product. This product uses a plunger similar to a medical hypodermic needle to load the icing into the dispenser. This is the method I chose to load sauce into the Signature for dispensing onto the plate. This is the final functional element for the design. Now, on to the physical form.

How should Signature Feel in the hand?

This is a critical USP that must be executed well for this to be an "Artigiano" product. There has to be a sense that one is holding something of quality, and superior ergonomic, and functional design.

Let's start with shape. Here are some examples of products with gripping surfaces that I found either visually appealing, or felt comfortable in the hand, or both:

Taking into consideration anthropometric data regarding hand sizes, shapes were created from foam to test how they felt in the hand. For a product that is hand-held, having something that one can actually hold in the hand is that only definitive way it can be

accurately judged. Attractive shapes in created in Solidworks are interesting, but aesthetics without proper function is not a successful design solution.

In concert with designing the shape of the grip, wrist angle is the next issue to consider. In general terms, this tool will be held in the same manner that as typical pen, or pencil would be held. The chosen grip will have to accommodate a comfortable wrist angle whilst the tool is in use. People were asked on an informal basis to comment on how the shape felt in their hand. Initial examples got positive feedback.

Hand size

To create a product which is usable to the greatest number of potential buyers, data from a wide range of user types in our target market will have to be considered. Hand size data will be critical here, to help achieve the goal of making a tool that is not too large for the hand of the targeted female user, and not too small a tool, where the targeted male user cannot get a comfortable grip.

Hand strength

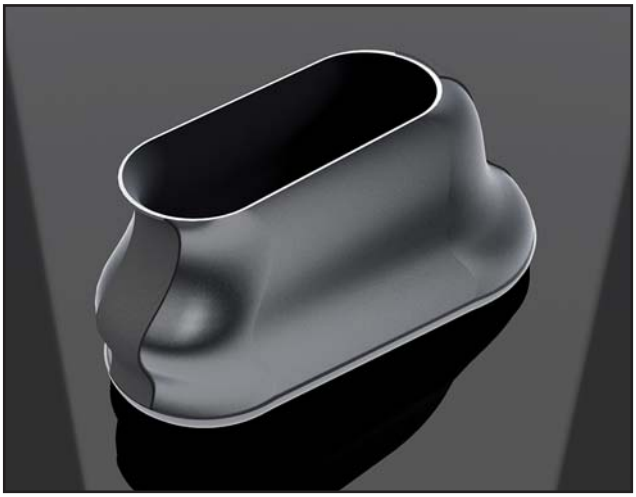
The next thing to consider is hand strength. There are two operations that need to be performed: 1) operate the plunger to draw sauce into the tool, and 2) the squeezing motion required to dispense the sauce. Existing hand strength data will be employed here to ensure that the tool will be accessible to the widest range or potential users.

Then of course, it has to look "Artigiano"

Elegant curves are the order of the day here. A shape that looks as appealing at it is comfortable. As seen in some of the readymade grip examples included in this section, there is a beauty to the form. This is an Artigiano design value: To make the form beautiful, not to add false decoration to poor design.

Form Development

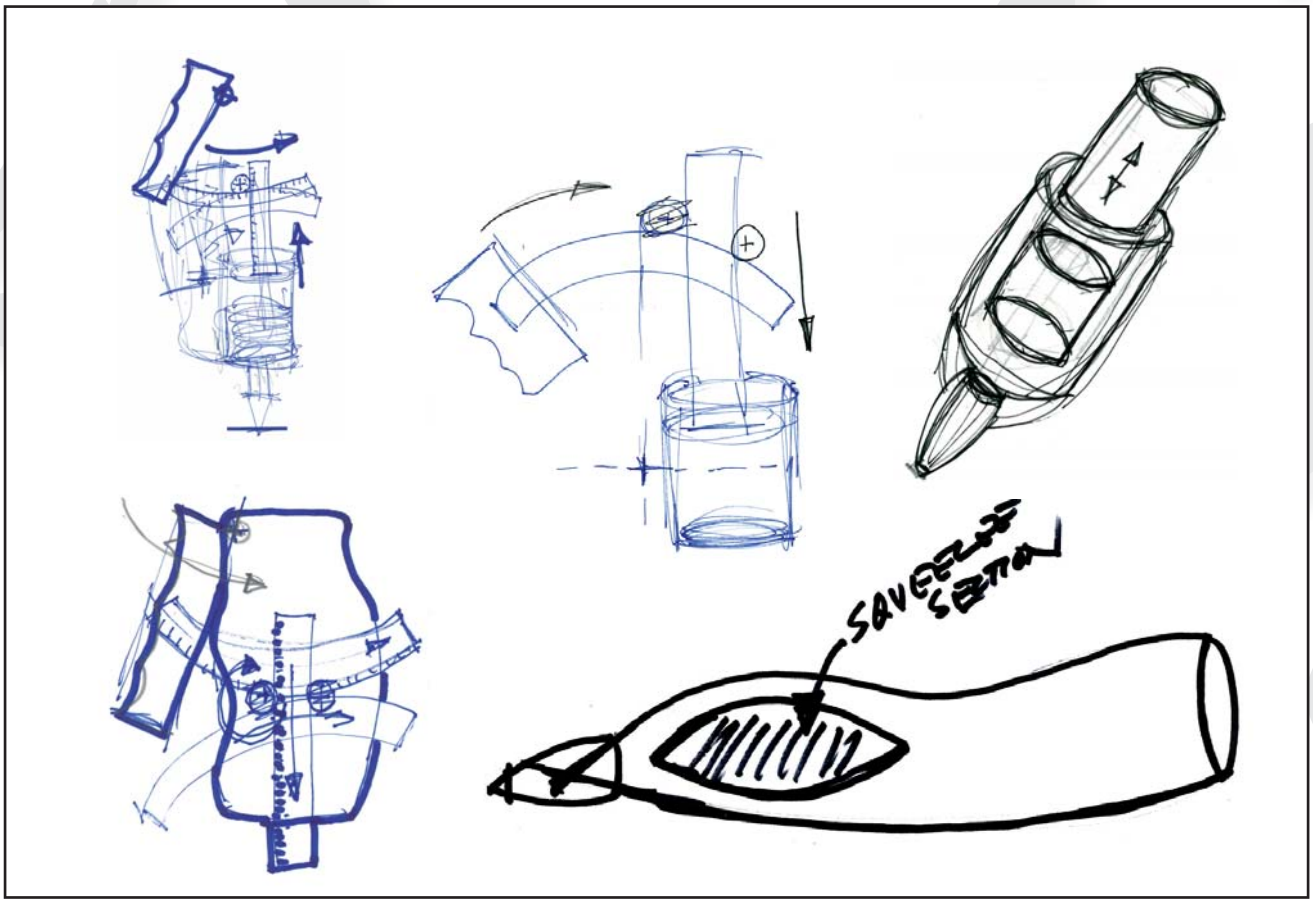
I began experimenting with some surfacing tools in Solidworks, creating some shapes that might feel good in the hand, and might lend themselves to containing liquid. The next task was to design a dispensing mechanism, with a finger actuator that would fit with such a shape.



The things that I was coming up with were far to Rube Goldberg, and much too complicated. I needed a way to dispense the liquid, using something with only a few moving parts.

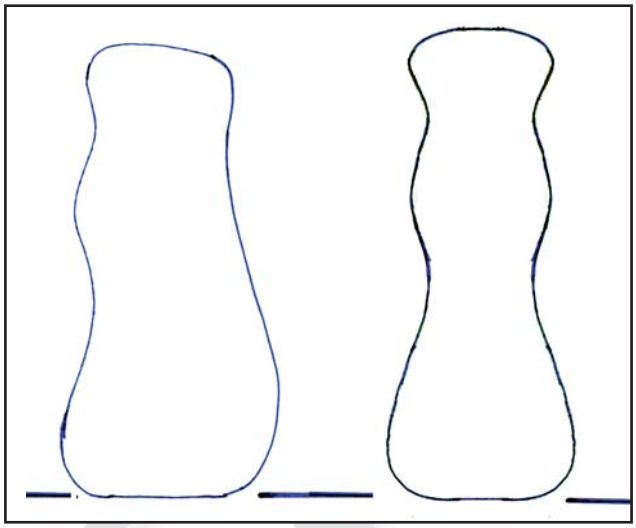
Then I came across the "Cuisipro Food Decorating Icing Pen". This discovery inspired both the dispensing action, and the filling method of the Signature product.

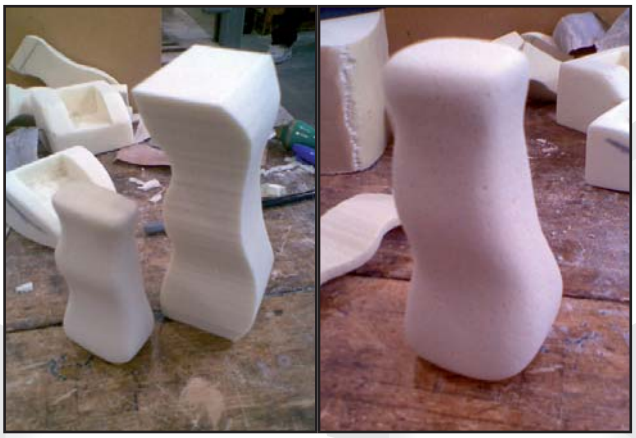
Shown below are assorted ideation scribbles, including an early concept that was to become the final form.



Foam Studies

I began fabricating grip shapes out of some medium density foam. This material is quick to shape, and allows for instant feedback. I sketched two ortho views (shown below), then spray glued them to a block of foam, and cut them out on the bandsaw.

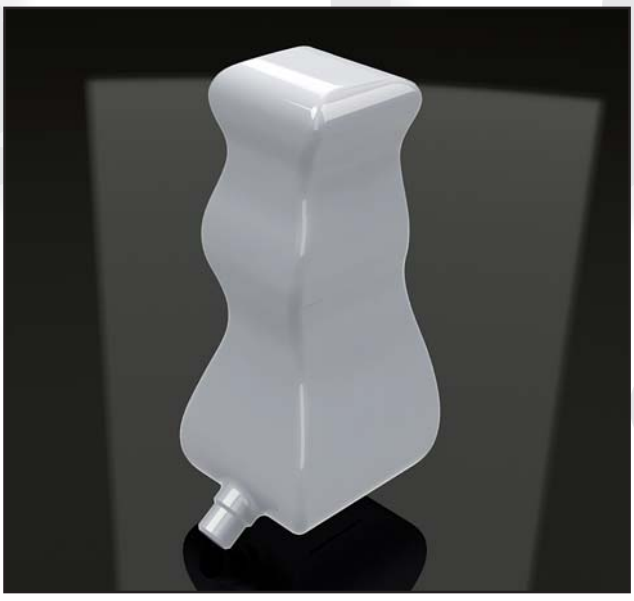




Shaping was done with rasps, files, and sandpaper. The ortho sketches were then scanned, then placed on planes in Solidworks, and the 3D model shown was created. Nothing worth pursuing came out of this particular type of shape, and it was abandoned.

The "Sauce Pen"

Something said in a tutorial session started me thinking or the act of using this product more literarily as writing. This started me down the path of a more pen-like shape. Starting with some initial Solidworks renderings, I fabricated a medium density form model, to get a sense of how it felt in the hand.

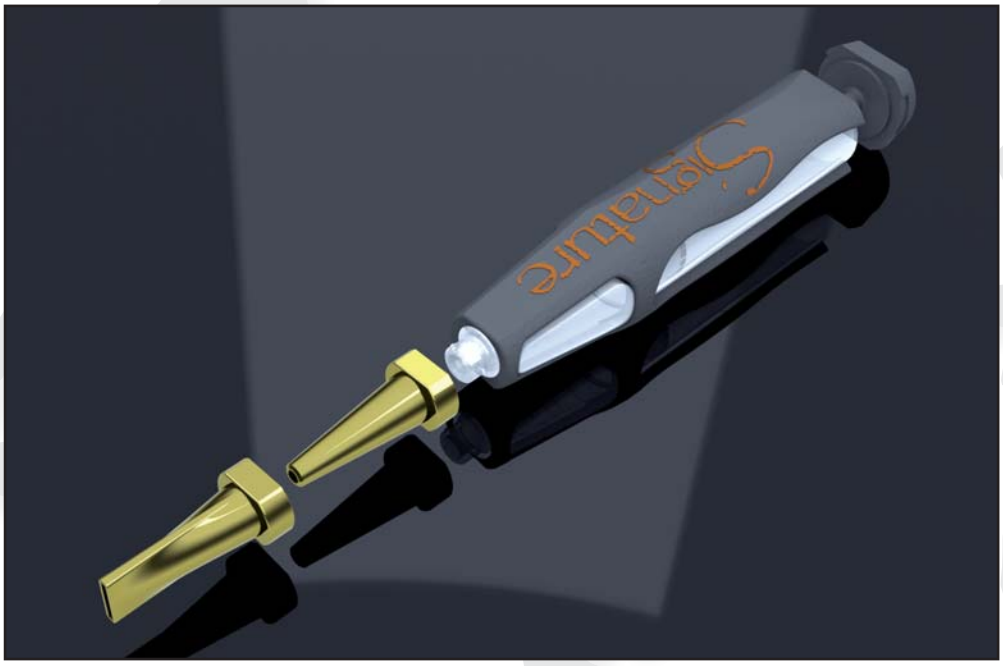


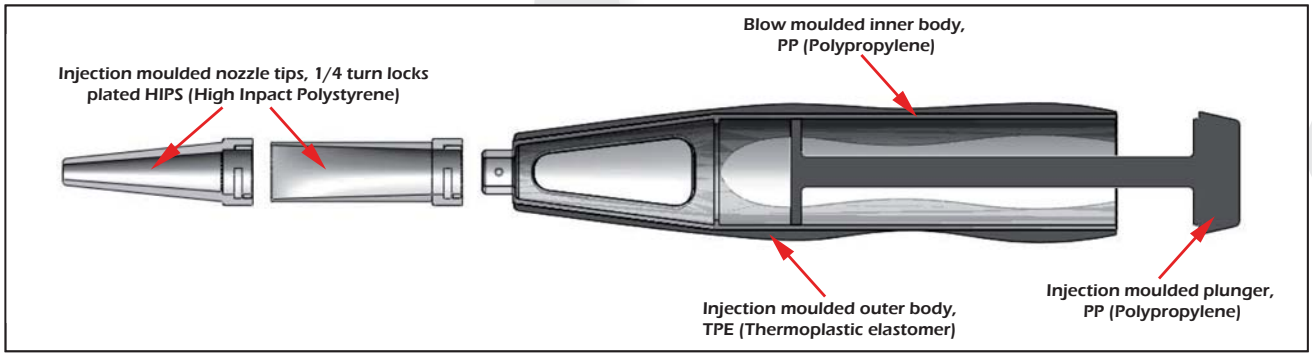
The Final Shape

Here is the final form for the Signature product. Shown here is the fabrication of the foam model, and an example of how it fits in the hand.

Also included here are Solidworks renderings of the complete tool, including 2 of the accessory tips, which attach with a one-quarter turn motion.

Finally, a cross section illustration of the tool is shown, with notations as to the materials used, and also the manufacturing method used to produce the part.





Further Development of the Signature Product

Here are some items and issues relating to the Artigiano Signature product design that are to be addressed at a future date:

1. Design of a work stand for three Signature utensils, and three vessels containing sauces. This was stated in the development section, but was not completed due to time constraints.

2. Design of additional accessory tips.

3. Mechanical mechanism for plunger alignment in relationship to the body. A key, or re-shaping of the body that keeps the body of the plunger aligned to the body as it is being used.

4. Revision of the styling to attract a broader audience. The Signature product has an aesthetic sensibility that we believe has more appeal to Western sensibilities. This needs to be studied for future products.

5. Investigation into more "green" materials. The goal is to make the Signature product 100% recyclable.

Branding

A lady, sitting next to Raymond Loewy at

dinner, struck up a conversation.

'Why', she asked 'did you put two Xs in Exxon?'

'Why ask?' he asked.

'Because', she said, 'I couldn't help noticing?'

'Well', he responded, 'that's the answer.'

— Alan Fletcher, The Art Of Looking Sideways

Artigiano

Origin of Our Name

Art-i-gi-a-no. An Italian translation of the term "craftsman". An craftsman is someone who is highly skilled in a particular art, or craft.

Marketing Personas

Patrick, 56 and Anne, 54
"Empty Nesters"

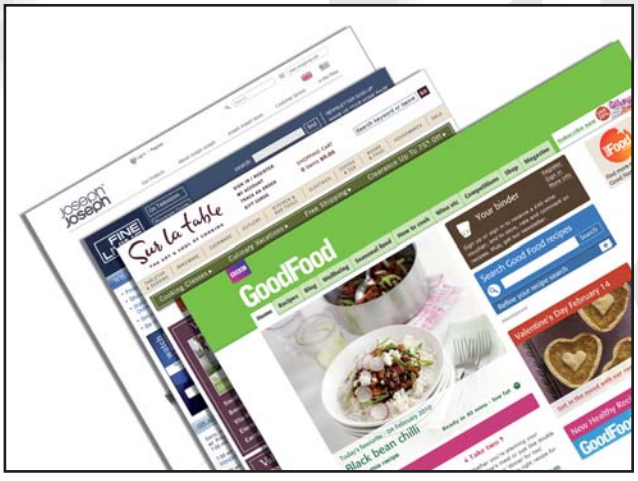
- Three grown children, who have moved out.
- They now have time to themselves.
- Have re-ignited their passion for food.
- Have re-designed their kitchen.
- Love hosting dinner parties for friends.
- Like gourmet food and fine wines.
- Avid watchers of cooking programs like Masterchef.
- Booked onto a cooking holiday in France this Summer.

Persona's Respected Brands

Our target personas will not only be aficionados in the kitchen. They will be enthusiasts in all of their product purchases. They are informed, and they don't make purchases in haste. This will be so in the automobile they choose to drive, the watch that they wear, and the retail outlets that they frequent.

The brands that have been displayed here are most certainly "Artigiano". Jager-leCoultre produce some of the finest wristwatches available, and just being aware of the brand marks you as an enthusiast.

Porsche Design has a definitely recognisable aesthetic that speaks of precision, and refinement. Liberty and Co. have a historic relationship with the finest in consumer goods. A walk through their establishment is an education in the finer things in life. Jaguar is a brand with a storied past that while in recent years has had some bumps in the road, is still a bona fide classic. Then or course there is Alfa. Ah, Even the presenters on Top Gear can't deny the "Italian-ness" that these automobiles exude. They inspire the driver to describe their motoring experience in passionate, nontechnical language, that demonstrates how effectively this brand communicates its values to the driver. This is very "Artigiano".

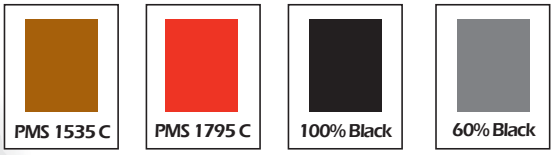


Corporate Colour Guidelines

Critical to the Artigiano brand identity is the consistency of the colours used, and presentation of the brand logo and associated product markings. The logo and product marking colours are referenced to Pantone PMS colours. The correct PMS numbers are specified below, along with RGB, CMYK, and web equivalent values. Also included, are greyscale values for the reproduction of the logo on such articles as hang tags, product manuals, and other printed materials.

Corporate Colour Proofing Guidelines

Colours will be proofed in a colour correct viewing environment, such as the GretagMacBeth Judge II-S Viewing Booth. Final approval of a first article will be required before the commencement of production of a new product.



Full Colour:

	Pantone #	RGB	CMYK	Web
Typography:	PMS 1535 C	R: 147 G: 67 B: 13	C: 30 M:77 Y: 100 K: 28	#8C4400
Underline:	PMS 1795 C	R: 214 G: 40 B: 40	C: 0 M: 94 Y: 100 K: 0	#D62828

Greyscale:

		RGB	CMYK	Web
Typography:	100% Black	R: 147 G: 67 B: 13	C:30 M:77 Y:100 K:28	#000000
Underline:	60% Black	R: 214 G: 40 B: 40	C:0 M:94 Y:100 K:0	#87888A

Do not use a digital print as colour reference.
Pantone colour guide should be used as final colour reference.

Ergonomics

"Almost any seat was comfortable at one-sixth of a gravity."

— Arthur C. Clarke (2061: Odyssey Three)

Artigiano

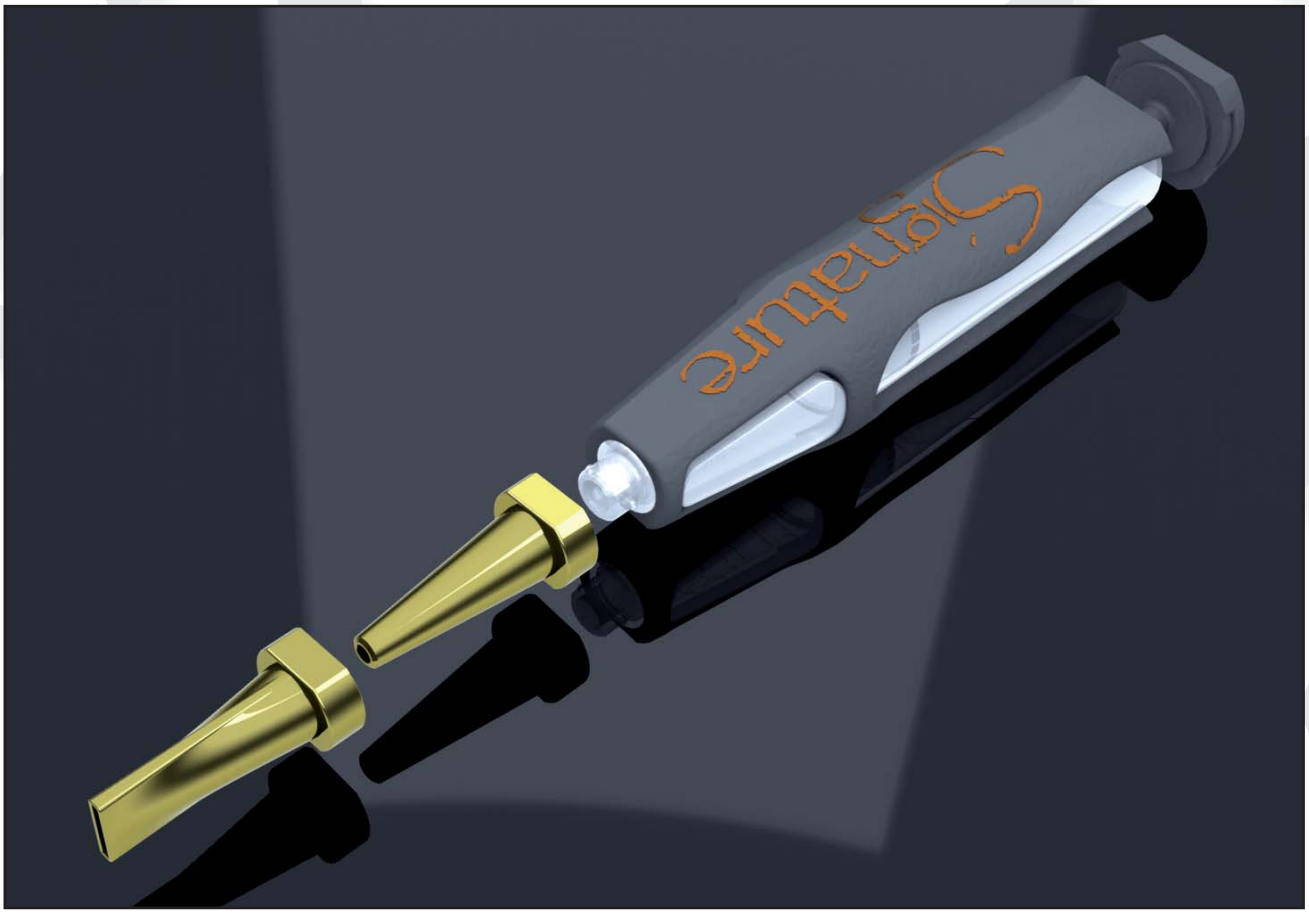
Cognitive Ergonomics

"In 1988, Donald Norman appropriated the term affordances in the context of human–machine interaction to refer to just those action possibilities that are readily perceivable by an actor" (Wiki).

The Signature offers good affordance, using three mental models that make the operation of the tool immediately familiar to the intended user:

- The cake decoration tool.
- The fountain pen.
- The hypodermic syringe.

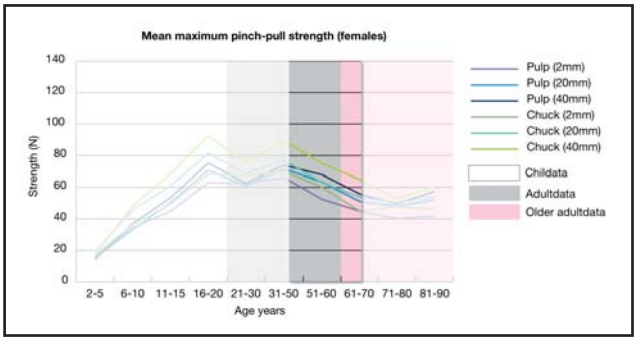
The consideration of cognitive ergonomic human factors in the design of the Signature make it not just an attractive tool or a comfortable tool in the hand, but added dimension of a product design that has an operation that is intuitive.

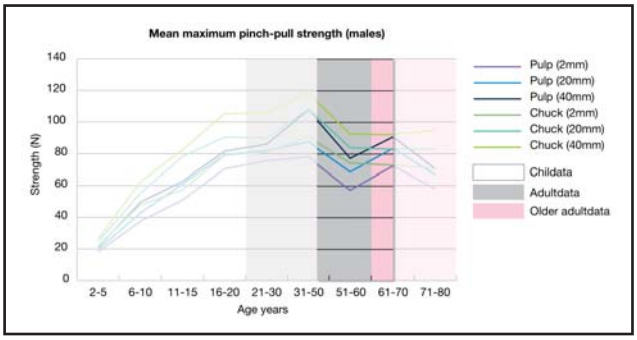


Physical Ergonomics

The physical forces required to operate the Signature must be within a range that the greatest percentage of our target market will be able to use it with little difficulty. This is a special concern here, as this population includes people who may be experiencing some physical limitations, particularly in hand strength and range of motion due to aging. The data presented here demonstrates this.

The use of polypropylene for the inner layer of the Signature's main body was chosen for the creation of the finger buttons. This material's good flexibility characteristics (living hinge) will work well for creating a button with a good feel, and durable for many operations.





1 handed grip strength

Age years	Sex	No.	Small handle - 30mm (N) Mean	SD	Range	Medium handle - 50mm (N) Mean	SD	Range	Large handle - 70mm (N) Mean	SD	Range
2-5	m	8	5.80	3.84	2.00 - 11.30	5.95	3.05	2.90 - 11.1	5.59	3.98	2.42 - 12.4
	f	9	4.60	1.44	2.84 - 6.18	4.43	1.78	2.33 - 8.31	3.18	1.15	2.20 - 5.50
6-10	m	7	17.20	2.68	13.90 - 20.70	18.99	6.00	12.50 - 29.10	17.58	6.12	10.10 - 27.90
	f	11	14.01	4.28	8.10 - 19.90	15.45	5.50	9.20 - 24.90	14.32	6.76	7.50 - 27.10
11-15	m	10	24.78	7.92	14.20 - 37.90	29.21	9.91	18.40 - 52.10	30.20	11.87	18.90 - 57.10
	f	10	19.32	3.73	12.80 - 24.80	23.44	5.86	14.10 - 32.10	23.14	7.03	12.40 - 34.50
16-20	m	9	43.83	11.31	25.80 - 61.20	52.28	12.96	34.80 - 79.80	49.23	7.68	39.60 - 64.70
	f	7	22.28	6.12	16.80 - 30.80	34.51	9.85	24.20 - 50.40	32.91	6.77	25.90 - 43.40
21-30	m	7	41.77	10.33	21.50 - 51.80	49.90	9.80	33.70 - 63.40	46.26	11.77	28.70 - 68.00
	f	7	25.93	4.84	20.80 - 33.70	28.20	4.25	23.60 - 36.80	27.21	5.10	18.30 - 31.90
31-50	m	6	46.38	6.44	37.40 - 54.00	54.03	7.04	43.10 - 64.40	52.07	6.32	44.00 - 60.30
	f	11	25.28	7.01	13.60 - 35.60	31.42	4.99	21.50 - 37.30	28.89	3.52	23.30 - 34.30
51-60	m	4	29.85	3.95	25.50 - 33.30	44.45	4.08	38.70 - 47.90	44.38	4.69	40.90 - 51.20
	f	6	21.18	4.64	16.60 - 28.30	29.47	5.49	24.30 - 36.20	28.00	6.03	21.40 - 38.60
61-70	m	6	32.42	8.17	20.30 - 40.80	43.07	5.49	36.40 - 50.30	42.95	7.04	35.20 - 52.10
	f	9	16.47	5.12	11.90 - 26.70	24.39	5.47	16.80 - 32.80	23.67	5.53	14.60 - 32.00
71-80	m	8	30.71	3.98	24.30 - 37.20	35.60	6.06	25.30 - 40.00	38.05	3.09	32.90 - 41.80
	f	12	16.83	6.34	6.86 - 30.50	21.17	4.76	13.20 - 28.60	22.98	4.94	17.20 - 34.30
81-90	f	6	12.08	5.12	4.05 - 19.60	16.00	4.56	7.81 - 21.00	16.32	2.99	11.80 - 19.80

Materials Science

Mr. McGuire: I just want to say one word to you - just one word.

Ben: Yes sir.

Mr. McGuire: Are you listening?

Ben: Yes I am.

Mr. McGuire: 'Plastics.'

Ben: Exactly how do you mean?

Mr. McGuire: There's a great future in plastics. Think about it. Will you think about it?

Ben: Yes I will.

Mr. McGuire: Shh! Enough said. That's a deal.

— From the Movie "The Graduate", 1967

Artigiano

Material Utilized, Plunger and Main Body

For the Signature's main body inner structure, Polypropylene was chosen. The translucent appearance will show the colour of the sauce, and will have an attractive glossy finish on the surface, that will contrast nicely with the matte surface of the TPE over moulding. As important as the appearance, the "living hinge" quality of PP will work well for creating the finger buttons that are depressed to dispense the sauce. This kind of flexibility, and durability will ensure long life, and a good feel to the button. A material data sheet is shown below.

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Polypropylene (PP)

Description

The material

Polypropylene, PP, first produced commercially in 1958, is the younger brother of polyethylene - a very similar molecule with similar price, processing methods and application. Like PE it is produced in very large quantities (more than 30 million tons per year in 2000), growing at nearly 10% per year, and like PE its molecule-lengths and side-branches can be tailored by clever catalysis, giving precise control of impact strength, and of the properties that influence molding and drawing. In its pure form polypropylene is flammable and degrades in sunlight. Fire retardants make it slow to burn and stabilizers give it extreme stability, both to UV radiation and to fresh and salt water and most aqueous solutions.

Composition (summary)

(CH2-CH(CH3))n

Image

Caption

Polypropylene is widely used in household products.

General properties

Density	890	-	910	kg/m^3
Price	* 0.808	-	0.889	GBP/kg

Mechanical properties

Young's modulus	0.896	-	1.55	GPa
Yield strength (elastic limit)	20.7	-	37.2	MPa
Tensile strength	27.6	-	41.4	MPa
Elongation	100	-	600	%
Hardness - Vickers	6.2	-	11.2	HV
Fatigue strength at 10^7 cycles	11	-	16.6	MPa
Fracture toughness	3	-	4.5	MPa.m^1/2

Thermal properties

Melting point	150	-	175	°C
Maximum service temperature	100	-	115	°C
Thermal conductor or insulator?	Good insulator			
Thermal conductivity	0.113	-	0.167	W/m.K
Specific heat capacity	1.87e3	-	1.96e3	J/kg.K
Thermal expansion coefficient	122	-	180	µstrain/°C

Electrical properties

Electrical conductor or insulator?	Good insulator

Optical properties

Transparency	Translucent

Eco properties

No warranty is given for the accuracy of this data. Values marked * are estimates.

Plastics Utilized, Nozzle Tip

High-Impact Polystyrene was used for Signature's accessory nozzle tips. This is the business end of the product, and will take most of the utensil's physical impacts. This material is used in such applications as the ballpoint pen tip covers, as shown in the example on the materials data sheet shown below. The Signature's tips have a brass plating, and this material accepts plating readily.

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Polystyrene (PS)

Description

The material

Polystyrene is an optically clear, cheap, easily molded polymer, familiar as the standard "jewel" CD case. In its simplest form PS is brittle. Its mechanical properties are dramatically improved by blending with polybutadiene, but with a loss of optical transparency. High impact PS (10% polybutadiene) is much stronger even at low temperatures (meaning strength down to -12C). The single largest use of PS is a foam packaging.

Composition (summary)

(CH(C6H5)-CH2)n

Image

Caption

Polystyrene is water-clear, easily formed and cheap.

General properties

Density	1.04e3	-	1.05e3	kg/m^3
Price	1.01	-	1.11	GBP/kg

Mechanical properties

Young's modulus	1.2	-	2.6	GPa
Yield strength (elastic limit)	28.7	-	56.2	MPa
Tensile strength	35.9	-	56.5	MPa
Elongation	1.2	-	3.6	%
Hardness - Vickers	8.6	-	16.9	HV
Fatigue strength at 10^7 cycles	14.4	-	23	MPa
Fracture toughness	0.7	-	1.1	MPa.m^1/2

Thermal properties

Maximum service temperature	76.9	-	103	°C
Thermal conductor or insulator?	Good insulator			
Thermal conductivity	0.121	-	0.131	W/m.K
Specific heat capacity	1.69e3	-	1.76e3	J/kg.K
Thermal expansion coefficient	90	-	153	µstrain/°C

Electrical properties

Electrical conductor or insulator?	Good insulator

Optical properties

Transparency	Optical Quality

Eco properties

Embodied energy, primary production	86	-	99	MJ/kg
CO2 footprint, primary production	2.7	-	3	kg/kg
Recycle	✓			

Recycle mark

No warranty is given for the accuracy of this data. Values marked * are estimates.

Text and Image References

http://www.allaboutbranding.com/index.lasso?article=22
(p.12)

http://www.saidwhat.co.uk/quotes/famous/leonardo_da_vinci/iron_rusts_from_disuse_stagnant_water_1533
(p.1)

http://www.goodreads.com/author/quotes/7779.Arthur_C_Clarke
(p.4, 21)

http://www.zedimage.com/pms-cmyk-hex.php
(p.23)

http://www.allbusiness.com/marketing/direct-marketing/114035-1.html
(p.2)

http://www.cheftools.com/Cuisipro-Food-Decorating-Icing-Pen/productinfo/02-2506/
(p.12)

http://design.caltech.edu/erik/Misc/design_quotes.html
(p.9)

ASTM D3332- Standard Test Methods for Mechanical-Shock Fragility of Products, Using Shock Machines
(p.5)

Sampling procedures for inspection by attributes. Sampling schemes indexed by acceptance quality limit for lot-by-lot inspection. British Standard BS6001-1. Geneva, International Organization for Standardization, 1999. ISO2859-1.
(p.5)

http://www.terumotmp.com/imgs/photos/1113a.jpg
(p.22)

http://www.penshop.co.uk/
(p.22)

http://ecx.images-amazon.com/images/I/31RDKtNo%2BkL.jpg
(p.22)

http://en.wikipedia.org/wiki/Affordance
(p.22)

Strength Data for design safety - Phase 1, Research commissioned by Consumer Affairs Division, DTI Department of Trade and Industry, 1 Victoria Street, London SW1H 0ET
(p.23)