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STATEMENT OF ORIGINALITY

I hereby certify that this project was prepared especially for this course, and that this or a similar version has not been submitted to any other course.

ACCESS INFORMATION

There is no special information required to access the application. The main page is located here:

http://cscie60.dce.harvard.edu/~ilebwohl/final_project/periodicTable.cfm

DESCRIPTION

The goal of this project is to create a database application for a company that makes and measures standards of measurement. The database is designed to keep track of the product catalog, current inventory, and certifications of measurement. The database also the company to log newly manufactured standards as well as certify their thickness.

This application is intended to act as an updated version of the database currently in use (a single-user Lotus Approach database whose structure was last updated in 2003). This application provides laboratory technicians the ability to accurately check the inventory for a given product, something that is currently done using a single-table Excel spreadsheet. This application also keeps track of available products and provides information about them, including their composition and specific densities. When logging newly manufactured standards, the database provides both front-end and back-end validation to ensure that it is within the 15% tolerance for a standard to be certified. Finally, this application keeps track of standards that have been certified and displays all of the standards associated with a given certification.

Please note that, while I modified the data model (from the original project proposal) to allow for the tracking and certification of standard *composition* as well as thickness, designing and implementing the front-end portion fell outside the scope of the project.

The following is a list of the pages in the application, as well as the form(s) and report(s) that are available on each:

MAIN PAGE (PERIODIC TABLE OF ELEMENTS/FIND A PART)

- Reports
 - Displays all of the elements in existence (except for the lanthanide and actinide groups, as they are not relevant to the company and posed a layout challenge that was not worth tackling)
 - Indicates which elements are part of at least one product sold by the company (highlighted in green)
 - Displays all of the products that consist solely of the list of elements chosen (that is, if the user chooses two elements, the application will only show products that consist of an alloy of those two elements) and that meet all other requirements specified by the other filters on the page

- Displays the products that have the complete or partial part number entered in the part number field
- Forms
 - The user can select one or more elements from the table. These will be submitted to a query that will return products that consists of the chosen single element or multi-element alloy.
 - The user can apply filters on product type and product thickness (as a range). The thickness filter is prepared to filter for Infinite standards¹. These filters affect what is displayed once the user selects one or more elements.
 - The user can select one or more products for which they would like to certify standards that have already been manufactured. When doing so, they can select any technician in the company to be the acting technician for this action.
 - The user can create a new standard for any given product by clicking on the “Create New” button next to that product in the table.

FIND A CERTIFICATION

- Reports
 - Displays all certifications that exist within the company (ordered by date and limited to a maximum of 5000 for the sake of performance).
 - This report displays in pages, as otherwise the results would be unwieldy and the table sort would crash the user’s browser (as it is done in Javascript)
 - Ideally, I would have done a new AJAX call for each page rather than loading the whole resultset before even displaying the page, but I did not implement that feature. The page currently takes a long time to load.
 - Displays all standards associated with a given certification
- Forms
 - None

CREATE STANDARD

- Reports
 - Displays the information associated with the product the user chose
 - This can be either the product for which they clicked “Create New” or the product whose part number they entered in the text box on the page
 - Display information relating to the standards the user creates as they create them (including the generated serial number)
- Forms
 - The user can change the product for which they are entering new standards using the text box on the page

¹ These are standards for which the company is certifying only composition, and not thickness. As I did not implement a front-end means of certifying composition, these are the only elements for which this type of certification is possible.

- The user can enter a thickness for the standard
 - This thickness is validated on both the front-end and the back-end to ensure that it is within an acceptable range of the target value for the product

BUGS AND OTHER ISSUES

- The “View Certifications” page loads very slowly. This is because the entire query resultset is loaded before the page displays. The fix for this would be to make a new AJAX call every time the user changes the page of the report they are viewing. The paging plugin I used supports this functionality.
- The elements on the periodic table page are not square or really even a uniform size/shape. The fix for this would be to move all other elements outside of the table in which the report displays (currently, other reports display *inside* the main report table, which is just bad practice)
- Changing the part number by which you are searching on the main page does not always trigger the report to run, or does so after some time. I think this might be because the ‘Change’ event is not firing until the user moves their focus from the search box. The fix is probably to add ‘Blur’ to the list of events on which the handler fires.
- A couple of the triggers seem not to work as expected, specifically the triggers to manage the stock listed for a given product in the tbPart table. The fix is likely to remove that field from the table and simply calculate the stock any time it is needed.

SPECIAL FEATURES

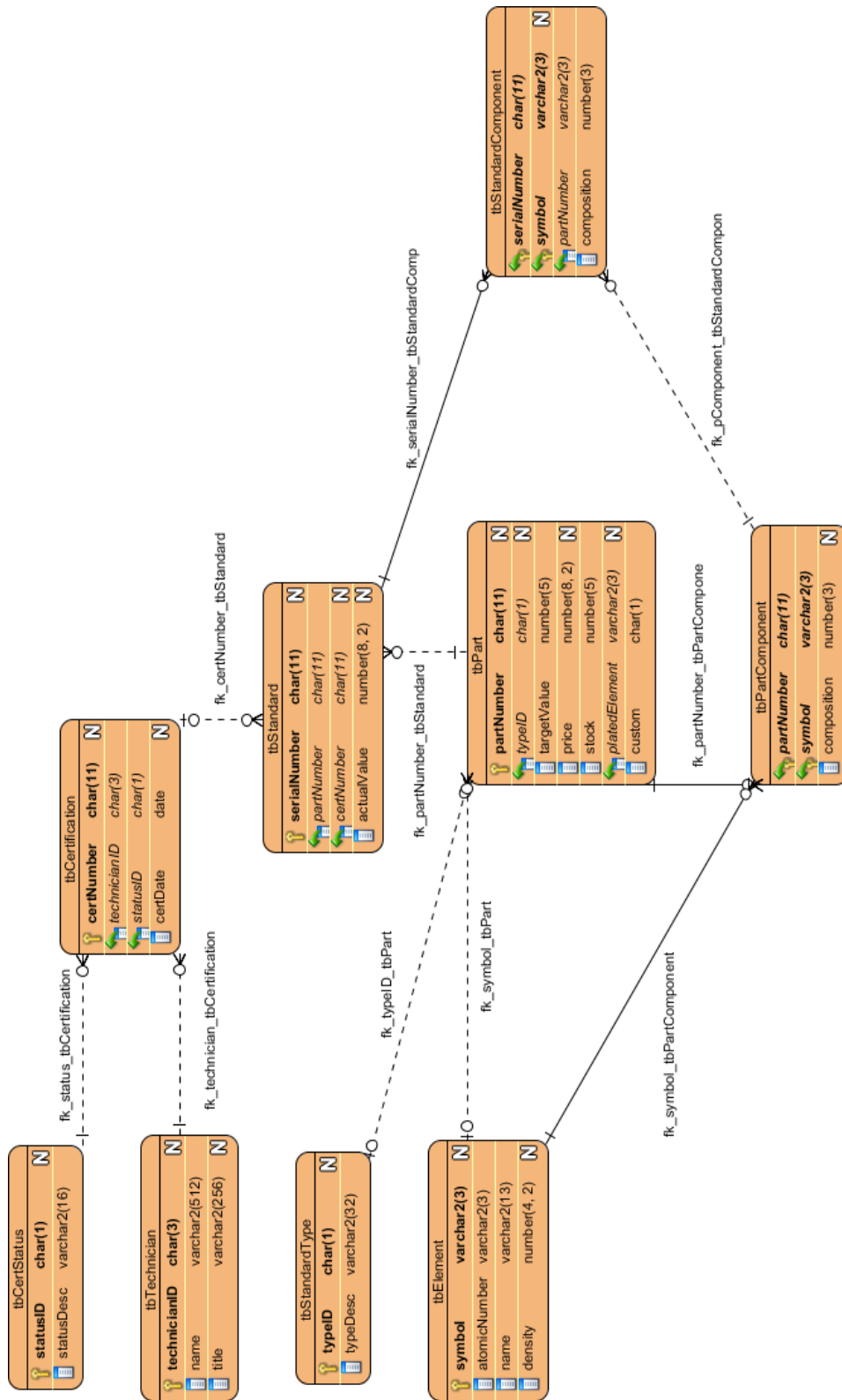
Implemented a simple “search by product number” feature on the main page. I also implemented a multi-input query that allows one or many filters to be applied in order to display the desired results. The results are displayed dynamically and in real time as the user changes filter settings. This is also on the main page of the application.

SCHEMA

See included file.

DATA MODEL

See next page.



Final Project Report for CSCI-E60

Wednesday, December 17, 2014

Isaac Lebwohl-Steiner

APPLICATION CODE

See included files.

SCREEN SHOTS

[MAIN PAGE](#)

Find a Part

View Certifications

Minimum thickness
2µin

☒ Foils ☒ Plated standards

Maximum thickness
500µin

Search by part number

H Hydrogen 0.06 g/cc																	He Helium 0.18 g/cc						
Li Lithium 0.54 g/cc	Be Beryllium 1.85 g/cc																	B Boron 2.48 g/cc	C Carbon 2.26 g/cc	N Nitrogen 1.25 g/cc	O Oxygen 1.43 g/cc	F Fluorine 1.70 g/cc	Ne Neon 0.90 g/cc
Na Sodium 0.97 g/cc	Mg Magnesium 1.74 g/cc	K Potassium 0.86 g/cc	Ca Calcium 1.55 g/cc	Sc Scandium 2.99 g/cc	Ti Titanium 4.51 g/cc	V Vanadium 6.11 g/cc	Cr Chromium 7.14 g/cc	Mn Manganese 7.47 g/cc	Fe Iron 7.87 g/cc	Co Cobalt 8.60 g/cc	Ni Nickel 8.91 g/cc	Cu Copper 8.92 g/cc	Zn Zinc 7.14 g/cc	Ga Gallium 5.90 g/cc	Ge Germanium 5.32 g/cc	As Arsenic 5.73 g/cc	Se Selenium 4.82 g/cc	Br Bromine 3.12 g/cc	Kr Krypton 3.75 g/cc				
Rb Rubidium 1.53 g/cc	Sr Strontium 2.63 g/cc	Y Yttrium 4.47 g/cc	Zr Zirconium 6.51 g/cc	Nb Niobium 8.57 g/cc	Mo Molybdenum 10.28 g/cc	Tc Technetium 11.50 g/cc	Ru Ruthenium 12.37 g/cc	Rh Rhodium 12.45 g/cc	Pd Palladium 12.02 g/cc	Ag Silver 10.46 g/cc	Cd Cadmium 8.65 g/cc	In Indium 7.31 g/cc	Sn Tin 7.31 g/cc	Sb Antimony 6.70 g/cc	Te Tellurium 6.24 g/cc	I Iodine 4.94 g/cc	Xe Xenon 0.01 g/cc						
Cs Cesium 1.88 g/cc	Ba Barium 3.51 g/cc			Hf Hafnium 13.31 g/cc	Ta Tantalum 16.65 g/cc	W Tungsten 19.25 g/cc	Re Rhenium 21.02 g/cc	Os Osmium 22.61 g/cc	Ir Iridium 22.85 g/cc	Pt Platinum 21.06 g/cc	Au Gold 19.30 g/cc	Hg Mercury 13.53 g/cc	Tl Thallium 11.85 g/cc	Pb Lead 11.34 g/cc	Bi Bismuth 9.78 g/cc	Po Polonium 9.20 g/cc	At Astatine	Rn Radon 0.01 g/cc					
Fr Francium	Ra Radium 5.00 g/cc			Rf Rutherfordium	Db Dubnium	Sg Seaborgium	Bh Bohrium	Hs Hassium	Mt Meitnerium	Uun Ununillium	Uuu Unununium	Uub Unbibium	Uut Ununtrium	Uuq Ununquadium	Uup Ununpentium	Uuh Ununhexium	Uus Ununseptium	Uuo Ununoctium					

Technician

Alma Tucker

SINGLE ELEMENT SEARCH WITH DEFAULT FILTERS

Find a Part

View Certifications

Minimum thickness

2µin

☒ Foils ☒ Plated standards

Maximum thickness

500µin

Search by part number

16 Products Found - None Selected for Certification

Part Number	Type	Thickness	Price	In Stock	Composition	Density	Certify Selected Clear Selections
P1111111471	Foil	2µin	\$765.00	88	100% Fe	7.87g/cc	Certify from Stock
							Create New
P1111111472	Foil	4µin	\$685.00	9	100% Fe	7.87g/cc	Certify from Stock

Technician

Alma Tucker

5	6	7	8	9	10
B	C	N	O	F	Ne
Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon
2.48 g/cc	2.26 g/cc	1.25 g/cc	1.43 g/cc	1.70 g/cc	0.90 g/cc
13	14	15	16	17	18
Al	Si	P	S	Cl	Ar
Aluminum	Silicon	Phosphorus	Sulfur	Chlorine	Argon
2.70 g/cc	2.33 g/cc	1.82 g/cc	1.98 g/cc	3.21 g/cc	1.78 g/cc
31	32	33	34	35	36
Ga	Ge	As	Se	Br	Kr
Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton
5.90 g/cc	5.32 g/cc	5.73 g/cc	4.82 g/cc	3.12 g/cc	3.75 g/cc
49	50	51	52	53	54
In	Sn	Sb	Te	I	Xe
Indium	Tin	Antimony	Tellurium	Iodine	Xenon
7.31 g/cc	7.31 g/cc	6.70 g/cc	6.24 g/cc	4.94 g/cc	0.01 g/cc
83	84	85	86	87	88
Pb	Bi	Po	At	Rn	
Lead	Bismuth	Polonium	Astatine	Radon	
11.34 g/cc	9.78 g/cc	9.20 g/cc		0.01 g/cc	
118	119	120	121	122	123
Uuo	Uuh	Uus	Uut	Uub	Uuq
Ununodum	Ununhexium	Ununseptium	Ununtrium	Ununbium	Ununquadium

SEARCH FOR AN ALLOY WITH DEFAULT FILTERS

Find a Part

View Certifications

Minimum thickness

2µin

☒ Foils ☒ Plated standards

Maximum thickness

500µin

Search by part number

32 Products Found - None Selected for Certification

Part Number	Type	Thickness	Price	In Stock	Composition	Density	Certify Selected Clear Selections
P1111111663	Foil	2µin	\$1125.00	15	70% Ni,30% Fe	8.57g/cc	Certify from Stock
P1111111664	Foil	4µin	\$1010.00	20	70% Ni,30% Fe	8.57g/cc	Create New
							Certify from Stock

Technician

Alma Tucker

5	6	7	8	9	10
B	C	N	O	F	Ne
Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon
2.48 g/cc	2.26 g/cc	1.25 g/cc	1.43 g/cc	1.70 g/cc	0.90 g/cc
13	14	15	16	17	18
Al	Si	P	S	Cl	Ar
Aluminum	Silicon	Phosphorus	Sulfur	Chlorine	Argon
2.70 g/cc	2.33 g/cc	1.82 g/cc	1.98 g/cc	3.21 g/cc	1.78 g/cc
29	30	31	32	33	34
K	Ca	Sc	Ti	V	Cr
Potassium	Calcium	Scandium	Titanium	Vanadium	Chromium
0.86 g/cc	1.55 g/cc	2.99 g/cc	4.51 g/cc	6.11 g/cc	7.14 g/cc
37	38	39	40	41	42
Rb	Sr	Y	Zr	Nb	Mo
Rubidium	Strontium	Yttrium	Zirconium	Niobium	Molybdenum
1.53 g/cc	2.63 g/cc	4.47 g/cc	6.51 g/cc	8.57 g/cc	10.28 g/cc
55	56	72	73	74	75
Cs	Ba	Hf	Ta	W	Re
Cesium	Barium	Hafnium	Tantalum	Tungsten	Rhenium
1.88 g/cc	3.51 g/cc	13.31 g/cc	16.65 g/cc	19.25 g/cc	21.02 g/cc
87	88	104	105	106	107
Fr	Ra	Rf	Db	Sg	Bh
Francium	Radium	Rutherfordium	Dubnium	Seaborgium	Bohrium
5.00 g/cc					
26	27	28	29	30	31
Fe	Co	Ni	Cu	Zn	Ga
Iron	Cobalt	Nickel	Copper	Zinc	Gallium
7.87 g/cc	8.90 g/cc	8.91 g/cc	8.92 g/cc	7.14 g/cc	5.90 g/cc
43	44	45	46	47	48
Tc	Ru	Rh	Pd	Ag	Cd
Technetium	Ruthenium	Rhodium	Palladium	Silver	Cadmium
11.50 g/cc	12.37 g/cc	12.45 g/cc	12.02 g/cc	10.49 g/cc	8.65 g/cc
51	52	53	54	55	56
Sb	Te	I	Xe		
Antimony	Tellurium	Iodine	Xenon		
6.70 g/cc	6.24 g/cc	4.94 g/cc	0.01 g/cc		
81	82	83	84	85	86
Tl	Pb	Bi	Po	At	Rn
Thallium	Lead	Bismuth	Polonium	Astatine	Radon
11.85 g/cc	11.34 g/cc	9.78 g/cc	9.20 g/cc		0.01 g/cc
113	114	115	116	117	118
Uut	Uuq	Uup	Uuh	Uus	Uuo
Ununtrium	Ununquadium	Ununpentium	Ununhexium	Ununseptium	Ununoctium

SEARCH FOR AN ALLOY WITH THICKNESS AND TYPE FILTERS MODIFIED

Find a Part

View Certifications

Minimum thickness

754µin

☒ Foils ☐ Plated standards

Maximum thickness

916µin

Search by part number

4 Products Found - None Selected for Certification

Part Number	Type	Thickness	Price	In Stock	Composition	Density	Certify Selected Clear Selections
P1111111685	Foil	760µin	\$110.00	84	70% Ni,30% Fe	8.57g/cc	Certify from Stock
							Create New
P1111111686	Foil	800µin	\$100.00	13	70% Ni,30% Fe	8.57g/cc	Certify from Stock

Technician

Alma Tucker

5	6	7	8	9	10
B	C	N	O	F	Ne
Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon
2.48 g/cc	2.26 g/cc	1.25 g/cc	1.43 g/cc	1.70 g/cc	0.90 g/cc
13	14	15	16	17	18
Al	Si	P	S	Cl	Ar
Aluminum	Silicon	Phosphorus	Sulfur	Chlorine	Argon
2.70 g/cc	2.33 g/cc	1.82 g/cc	1.98 g/cc	3.21 g/cc	1.78 g/cc
31	32	33	34	35	36
Ga	Ge	As	Se	Br	Kr
Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton
5.90 g/cc	5.32 g/cc	5.73 g/cc	4.82 g/cc	3.12 g/cc	3.75 g/cc
49	50	51	52	53	54
In	Sn	Sb	Te	I	Xe
Indium	Tin	Antimony	Tellurium	Iodine	Xenon
7.31 g/cc	7.31 g/cc	6.70 g/cc	6.24 g/cc	4.94 g/cc	0.01 g/cc
81	82	83	84	85	86
Tl	Pb	Bi	Po	At	Rn
Thallium	Lead	Bismuth	Polonium	Astatine	Radon
11.85 g/cc	11.34 g/cc	9.78 g/cc	9.20 g/cc		0.01 g/cc
113	114	115	116	117	118
Uut	Uuq	Uup	Uuh	Uus	Uuo
Ununtrium	Ununquadium	Ununpentium	Ununhexium	Ununseptium	Ununoctium

Final Project Report for CSCI-E60

Wednesday, December 17, 2014

Isaac Lebwohl-Steiner

SEARCH FOR AN INFINITE (THERE ARE ONLY A FEW OF THESE IN THE DATABASE CURRENTLY)

Find a Part View Certifications

Minimum thickness
 ∞ μin

☒ Foils ☐ Plated standards

Maximum thickness
 ∞ μin

Search by part number

1 Products Found - None Selected for Certification

Part Number	Type	Thickness	Price	In Stock	Composition	Density	Certify Selected Clear Selections
P1111111927	Infinite	1002µin	\$200.00	4	100% Fe	7.87g/cc	Certify from Stock Create New

Technician

Alma Tucker

<

SELECTING STANDARDS FOR CERTIFICATION AND CHANGING THE ACTING TECHNICIAN

Find a PartView Certifications

Minimum thickness

2µin

Maximum thickness

500µin

☒ Foils
 ☒ Plated standards

Search by part number

16 Products Found - 2 Selected for Certification

Part Number	Type	Thickness	Price	In Stock	Composition	Density	Certify Selected Clear Selections
P1111111471	Foil	2µin	\$705.00	88	100% Fe	7.87g/cc	Certify from Stock Create New
P1111111472	Foil	4µin	\$685.00	9	100% Fe	7.87g/cc	Certify from Stock Create New

Technician

Alma Tucker

Junior laboratory technician

Alma Tucker

Gary Phelps

Laboratory technician

Amber Cruz

Charlotte Bowman

Clarence Washington

Israel Vargas

Lori Klein

Mitchell Fuller

Senior laboratory technician

Christine Bowers

Dean Weaver

CERTIFYING SELECTED STANDARDS

Confirm Certification

Charlotte Bowman is about to certify 2 products:

P1111111471

P1111111472

Confirm

Cancel

SEARCHING BY PART NUMBER

Find a Part

View Certifications

Minimum thickness
2µin

☒ Foils ☒ Plated standards

Maximum thickness
500µin

Search by part number

P111111178

Part Number	Type	Thickness	Price	In Stock	Composition	Density	Certify Selected Clear Selections
P1111111780	Foil	720µin	\$90.00	28	100% Pb	11.34g/cc	Certify from Stock Create New
P1111111781	Foil	780µin	\$80.00	21	100% Pb	11.34g/cc	Certify from Stock Create New

Technician

Charlotte Bowman

1	2
H Hydrogen 0.09 g/cc	He Helium 0.18 g/cc
3	4
Li Lithium 0.54 g/cc	Be Beryllium 1.85 g/cc
11	12
Na Sodium 0.97 g/cc	Mg Magnesium 1.74 g/cc
19	20
K Potassium 0.86 g/cc	Ca Calcium 1.55 g/cc
37	38
Rb Rubidium 1.53 g/cc	Sr Strontium 2.63 g/cc
55	56
Cs Cesium 1.88 g/cc	Ba Barium 3.51 g/cc
87	88
Fr Francium 1.00 g/cc	Ra Radium 5.00 g/cc
21	22
Sc Scandium 2.99 g/cc	Ti Titanium 4.51 g/cc
39	40
Y Yttrium 4.47 g/cc	Zr Zirconium 6.51 g/cc
71	72
Lu Lutetium 9.48 g/cc	Hf Hafnium 13.31 g/cc
101	102
Db Dubnium 10.35 g/cc	Rf Rutherfordium 12.01 g/cc
103	104
Bh Bohrium 10.82 g/cc	Hs Hassium 10.22 g/cc
105	106
Db Dubnium 10.35 g/cc	Sg Seaborgium 12.01 g/cc
107	108
Bh Bohrium 10.82 g/cc	Hs Hassium 10.22 g/cc
109	110
Mt Meitnerium 10.82 g/cc	Uun Ununium 10.82 g/cc
111	112
Uuu Ununium 10.82 g/cc	Uub Ununium 10.82 g/cc
113	114
Uut Ununium 10.82 g/cc	Uuq Ununium 10.82 g/cc
115	116
Uup Ununium 10.82 g/cc	Uuh Ununium 10.82 g/cc
117	118
Uus Ununium 10.82 g/cc	Uuo Ununium 10.82 g/cc

CREATING A NEW STANDARD

Search by part number

64 Products Found - None Selected for Certification

Part Number	Type	Thickness	Price	In Stock	Composition	Density	Certify Selected Clear Selections
P1111111735	Plated (Fe)	2µin	\$625.00	7	100% Ni	8.91g/cc	Certify from Stock Create New
P1111111711	Plated (Cu)	2µin	\$815.00	12	100% Ni	8.91g/cc	Certify from Stock Create New

Technician

Charlotte Bowman

5	6
B Boron 2.48 g/cc	C Carbon 2.26 g/cc
13	14
Al Aluminum 2.70 g/cc	Si Silicon 2.33 g/cc
31	32
Ga Gallium 5.90 g/cc	Ge Germanium 5.32 g/cc
49	50
In Indium 7.31 g/cc	Sn Tin 7.31 g/cc
81	82
Tl Thallium 11.85 g/cc	Pb Lead 11.34 g/cc
113	114
Uut Ununium 10.82 g/cc	Uuq Ununium 10.82 g/cc

STANDARDS ENTERED AND ENTERING AN INVALID THICKNESS

Part

View Certifications

Part Number

P1111111735

Change

Serial Number

S1111193439

S1111193438

Create standard

77

Please enter a value less than or equal to 2.3.

Type	Target Thickness	Price	In Stock	Co
Plated (Fe)	2µin	\$825.00	7	100%
	2.09			
	1.97			

VIEWING ALL CERTIFICATIONS

Find a Part

View Certifications

LOADING

Find a Part

View Certifications

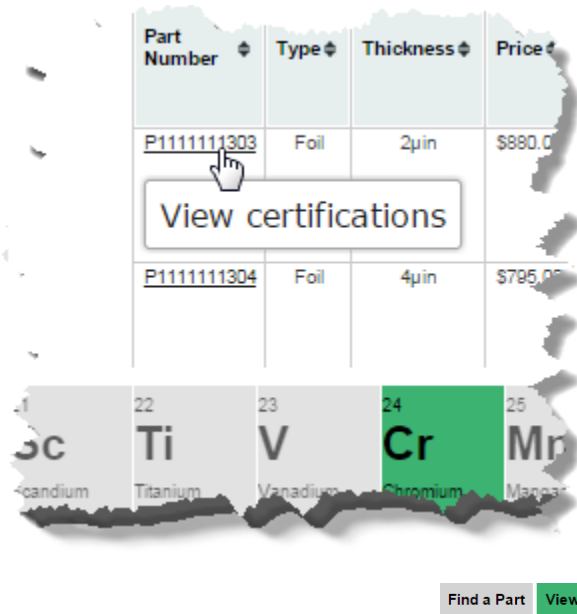
Certifications

	Certification Number	Certification Date	Technician	Status
+	C1111111334	2014-12-23 00:00:00.0	Mitchell Fuller	Complete
+	C1111113582	2014-12-23 00:00:00.0	Dean Weaver	Complete
+	C1111114272	2014-12-23 00:00:00.0	Charlotte Bowman	Requested
+	C1111114738	2014-12-23 00:00:00.0	Alma Tucker	Complete
+	C1111116042	2014-12-23 00:00:00.0	Lori Klein	In Progress
+	C1111116806	2014-12-23 00:00:00.0	Clarence Washington	Complete
+	C111111616	2014-12-22 00:00:00.0	Amber Cruz	In Progress
+	C1111112908	2014-12-22 00:00:00.0	Lori Klein	In Progress
+	C1111113994	2014-12-22 00:00:00.0	Dean Weaver	Complete
+	C1111116672	2014-12-22 00:00:00.0	Christine Bowers	Requested

1/340

10

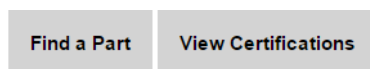
VIEW ALL CERTIFICATIONS FOR A SPECIFIC PART NUMBER



Certifications

Certification Number		Certification Date					Technician		Status			
	C1111128370	2014-12-15 00:00:00.0					Gary Phelps		Complete			
Serial Number							Part Number	Composition	Density	Type	Target Value	Actual Value
S1111129997							P1111111303	100% Co	8.90g/cc	Foil	2µin	2.08µin
	C1111128316	2014-12-15 00:00:00.0					Charlotte Bowman		In Progress			
	C1111128370	2014-12-15 00:00:00.0					Gary Phelps		Complete			
	C1111128332	2014-12-13 00:00:00.0					Christine Bowers		Requested			
	C1111128318	2014-12-02 00:00:00.0					Mitchell Fuller		Complete			
	C1111128352	2014-10-10 00:00:00.0					Charlotte Bowman		In Progress			
	C1111128306	2014-10-06 00:00:00.0					Gary Phelps		In Progress			
	C1111128368	2014-09-19 00:00:00.0					Alma Tucker		Complete			
	C1111128362	2014-09-17 00:00:00.0					Clarence Washington		Requested			
	C1111128360	2014-08-28 00:00:00.0					Gary Phelps		Requested			

USER MODIFIES A GET VARIABLE OR SOME OTHER KIND OF ERROR OCCURS



The application has encountered an error or has received invalid input.

Please use your browser's Back button to return to the page and try again, or use the navigation buttons above to go to another part of the application.