Final Project Report for CSCI-E60

Wednesday, December 17, 2014

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CONTENTS

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.

There are triggers in place to generate unique IDs wherever they are needed (part numbers, standard serial numbers, and certification numbers). There is also a trigger in place to ensure that, if an element is marked as 'Plated' it has a plated element specified for it. Finally, there are triggers in place to ensure that, to the greatest extent possible, each standard has an appropriate composition specified.

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 standards[1]. 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)

[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.

- Forms
  - The user can change the product for which they are entering new standards using the text box on the page
  - 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

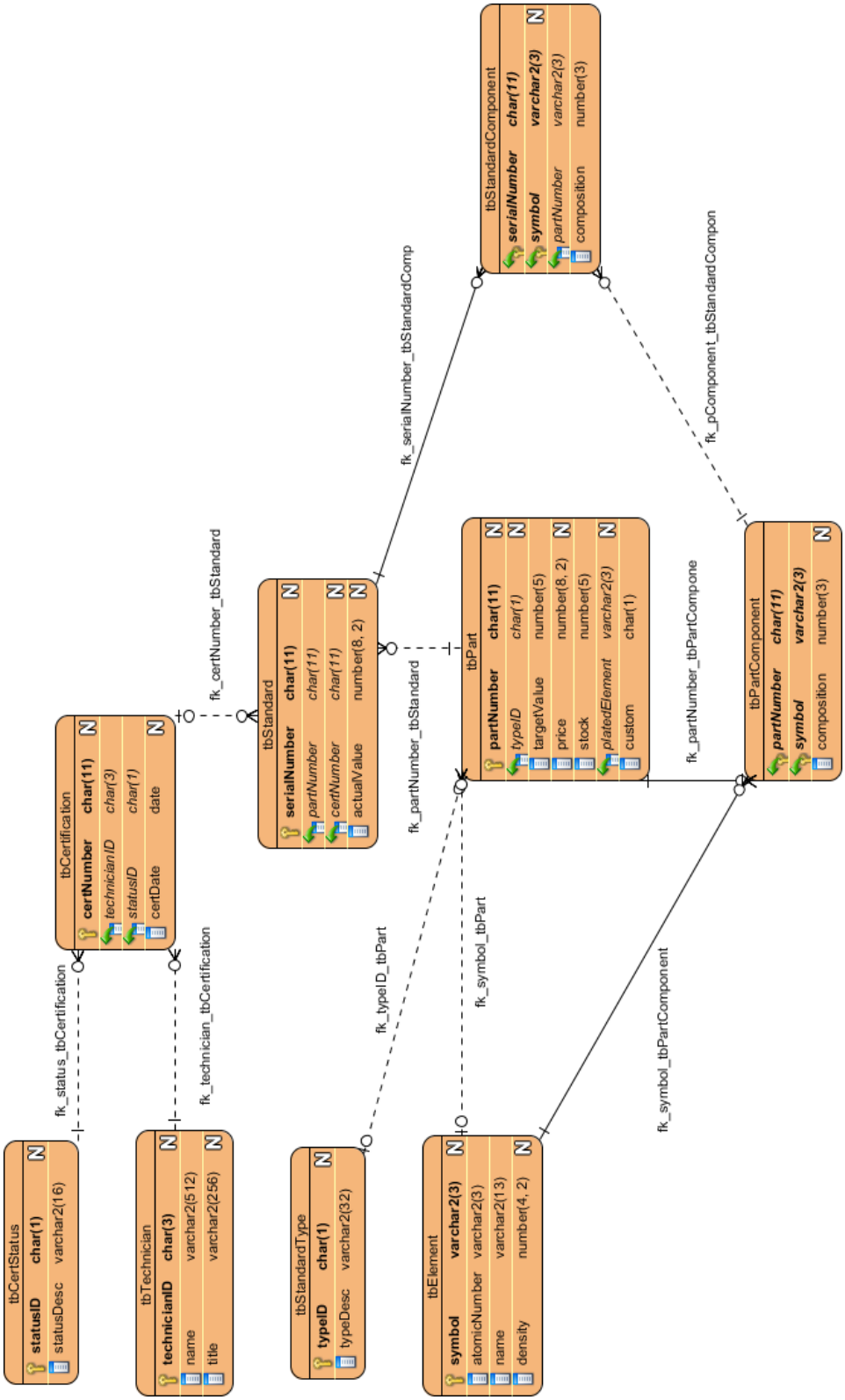
Implemented a simple "search by product number" feature on the main page. I also implemented a multi-input query that allows one or many filters to be applied in order to display the desired results. The results are displayed dynamically and in real time as the user changes filter settings. This is also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

SCHEMA

See included file.

DATA MODEL

See next page.

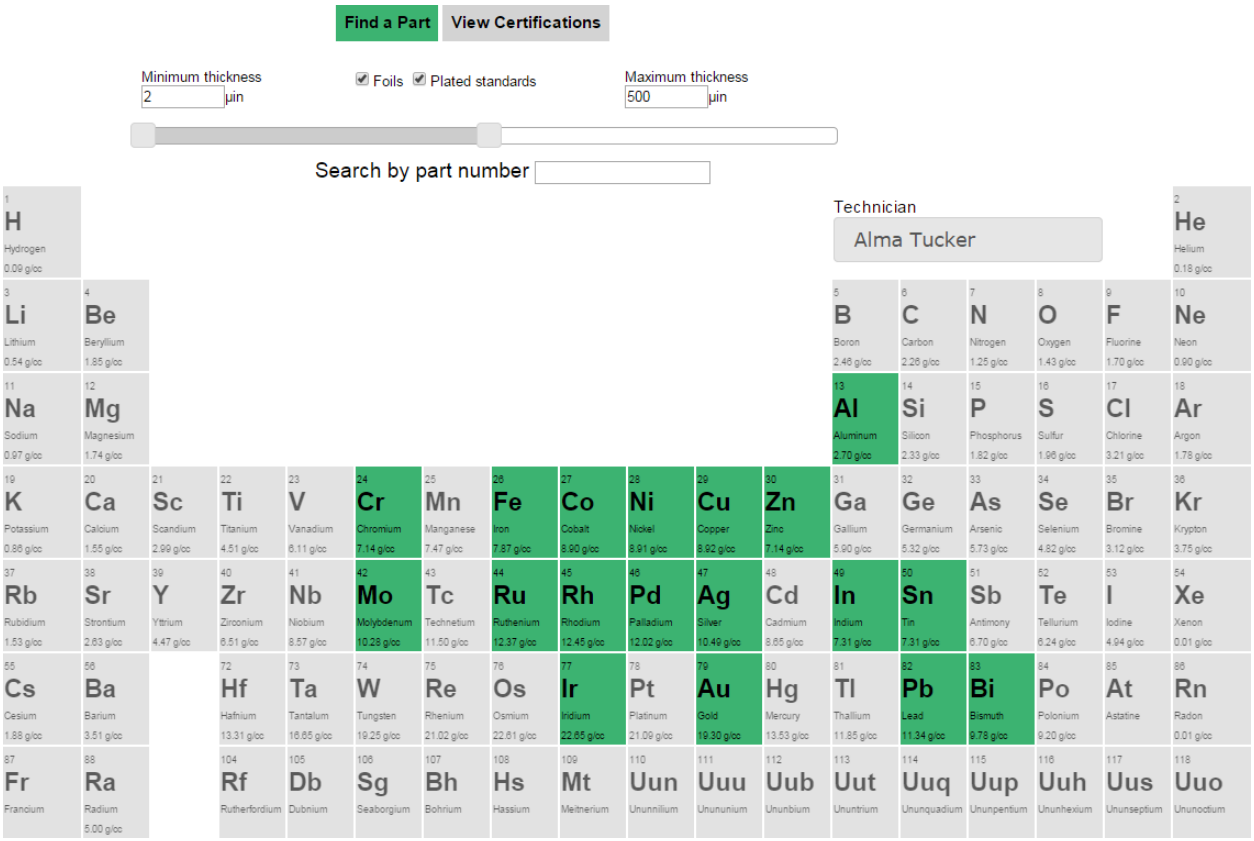

tbCertStatus
statusID char(1) N
statusDesc varchar2(16)
tbCertification
certNumber char(11) N
technicianID char(3)
statusID char(1)
certDate date N
tbTechnician
technicianID char(3) N
name varchar2(512)
title varchar2(256) N
tbStandard
serialNumber char(11) N
partNumber char(11)
certNumber char(11) N
actualValue number(8, 2) N
tbStandardComponent
serialNumber char(11)
symbol varchar2(3) N
partNumber varchar2(3)
composition number(3)
tbPart
partNumber char(11) N
typeID char(1) N
targetValue number(5)
price number(8, 2) N
stock number(5)
platedElement varchar2(3) N
custom char(1)
tbPartComponent
partNumber char(11)
symbol varchar2(3) N
composition number(3) N
tbStandardType
typeID char(1) N
typeDesc varchar2(32)
tbElement
symbol varchar2(3) N
atomicNumber varchar2(3)
name varchar2(13)
density number(4, 2) N
fk_status_tbCertification
fk_technician_tbCertification
fk_certNumber_tbStandard
fk_serialNumber_tbStandardComp
fk_pComponent_tbStandardCompon
fk_partNumber_tbStandard
fk_partNumber_tbPartCompone
fk_typeID_tbPart
fk_symbol_tbPart
fk_symbol_tbPartComponent

APPLICATION CODE

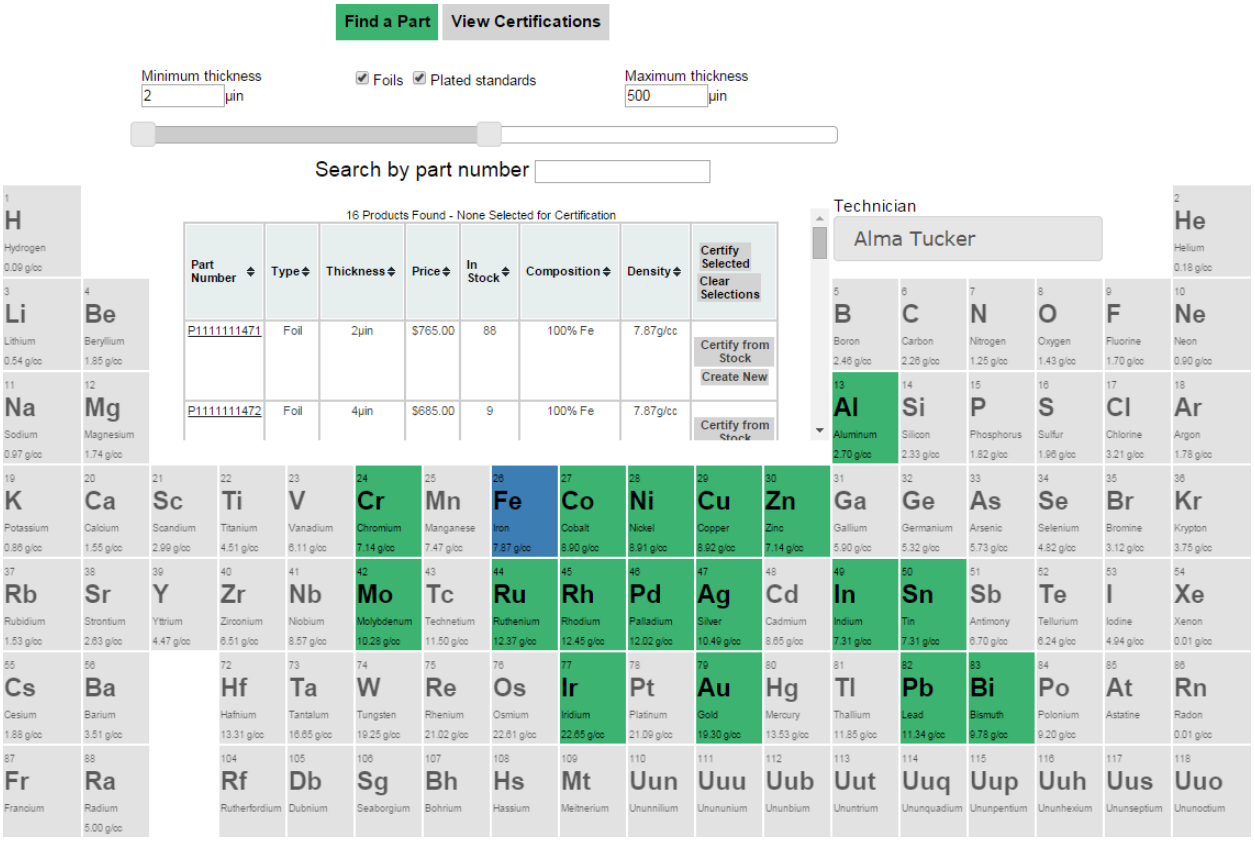
See included files.

SCREEN SHOTS

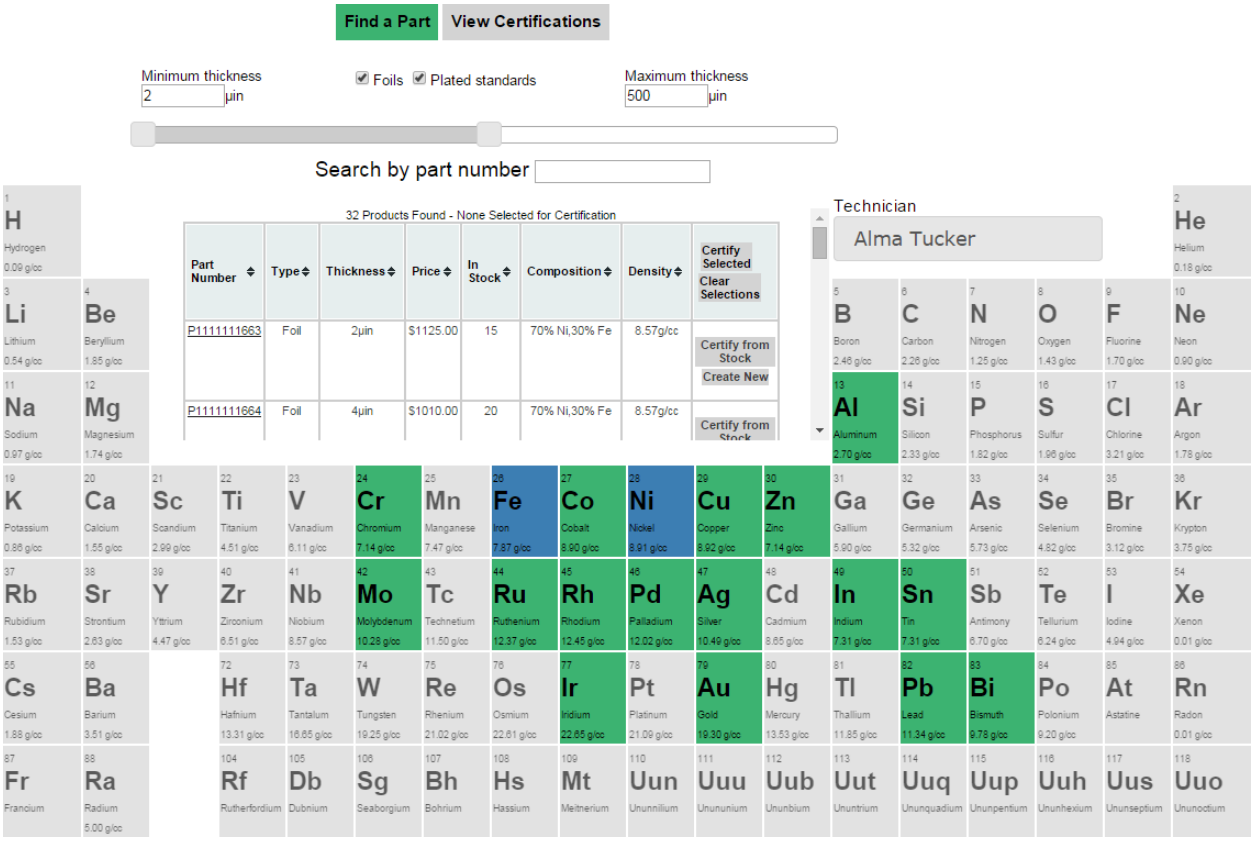
MAIN PAGE



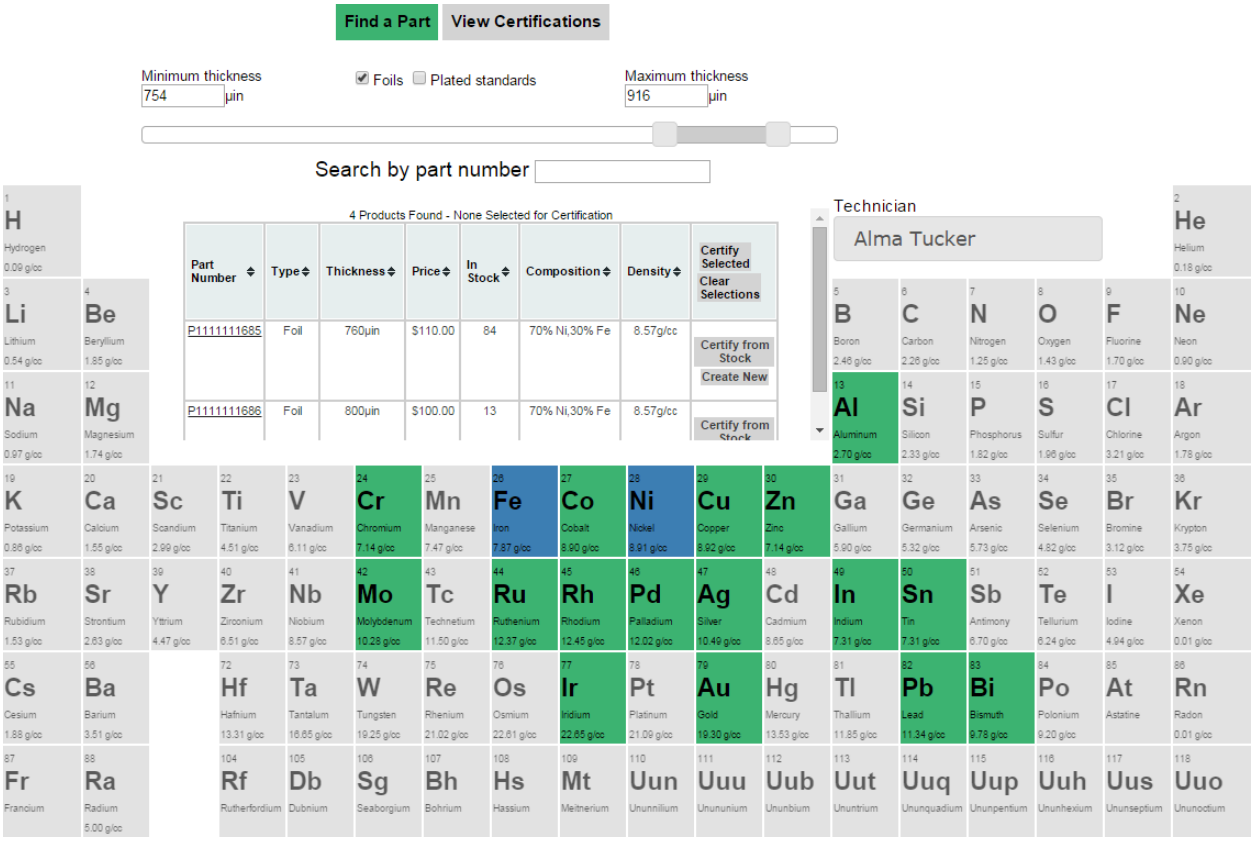
SINGLE ELEMENT SEARCH WITH DEFAULT FILTERS



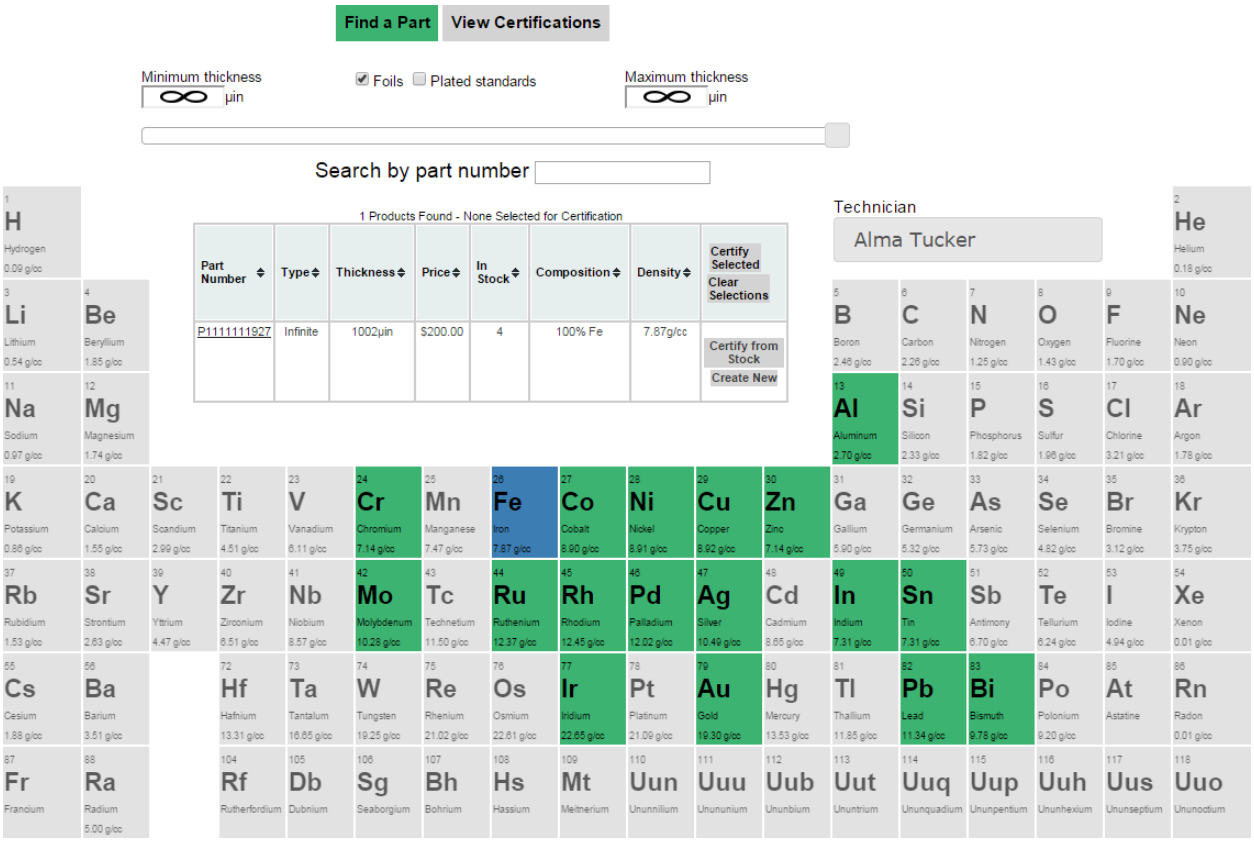
SEARCH FOR AN ALLOY WITH DEFAULT FILTERS



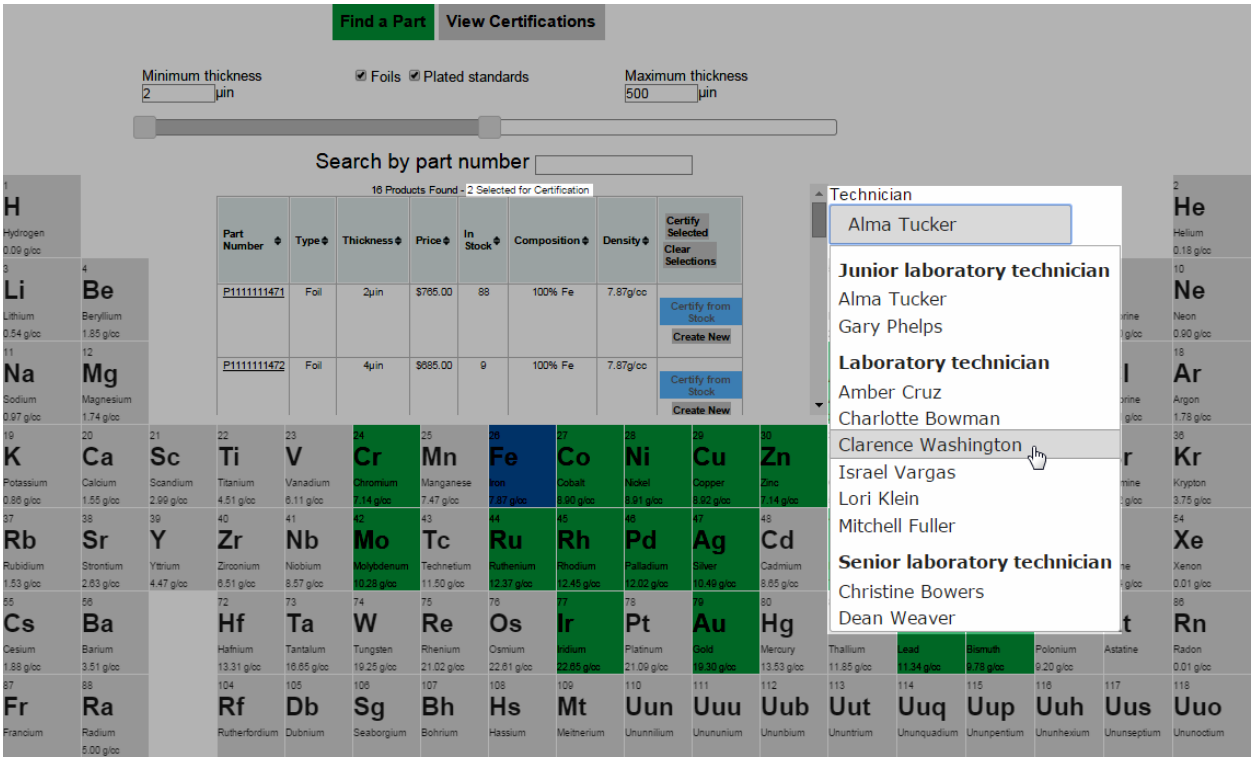
SEARCH FOR AN ALLOY WITH THICKNESS AND TYPE FILTERS MODIFIED



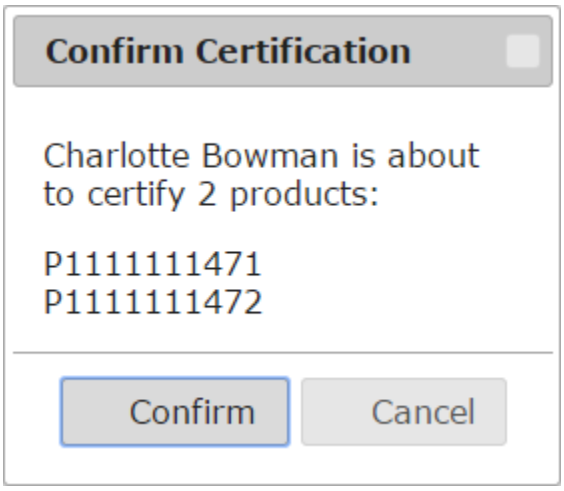
SEARCH FOR AN INFINITE (THERE ARE ONLY A FEW OF THESE IN THE DATABASE CURRENTLY)



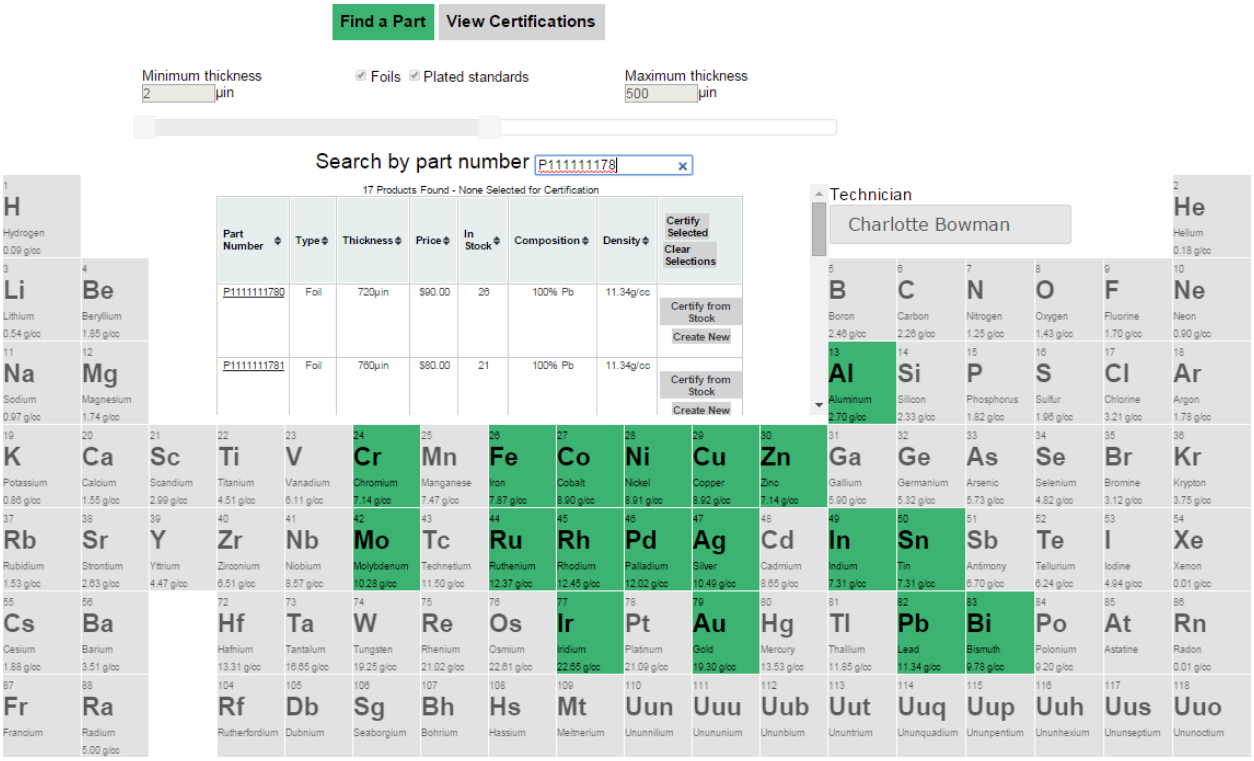
SELECTING STANDARDS FOR CERTIFICATION AND CHANGING THE ACTING TECHNICIAN



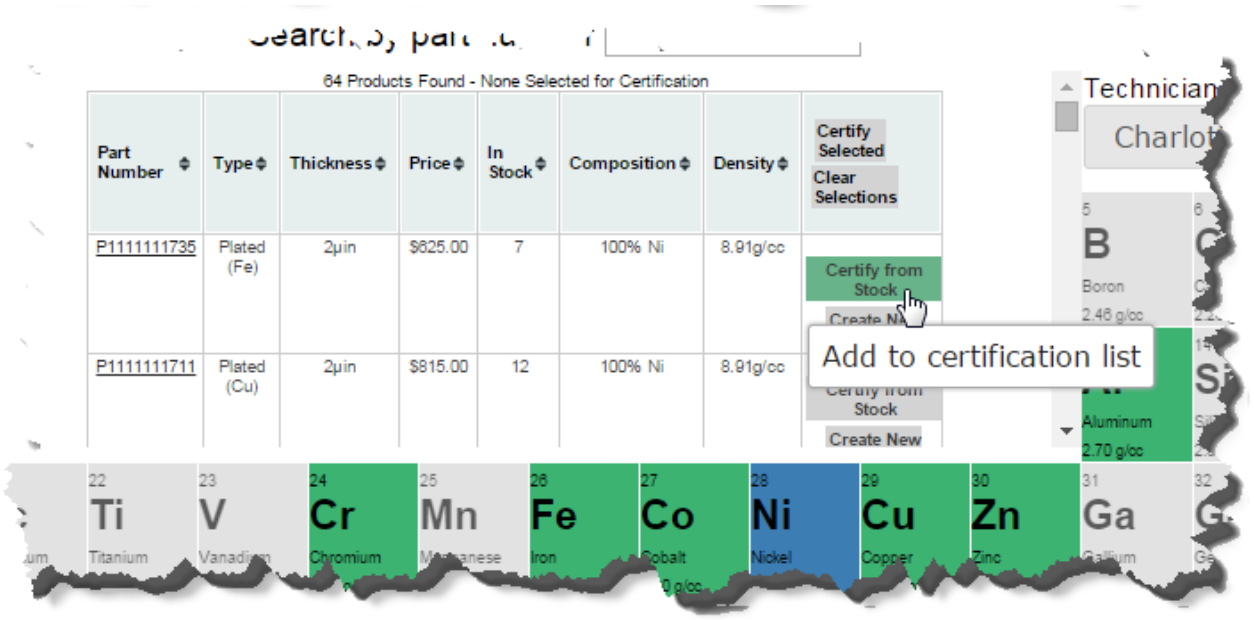
CERTIFYING SELECTED STANDARDS



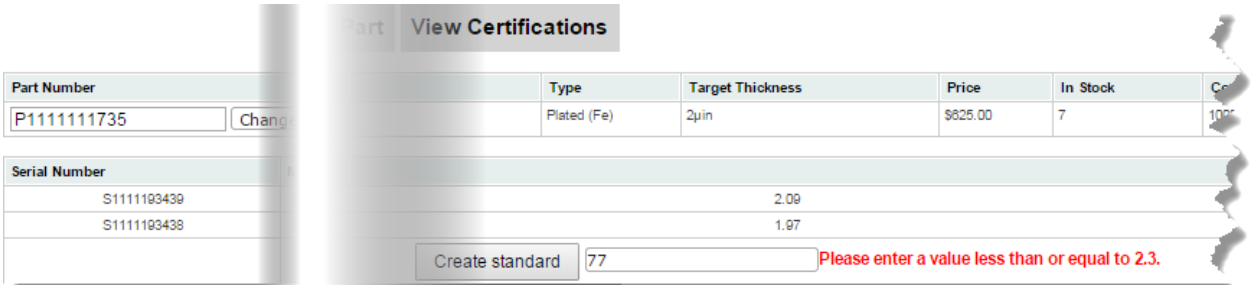
SEARCHING BY PART NUMBER



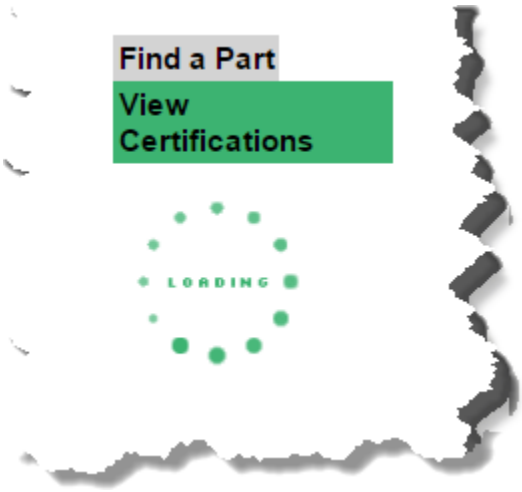
CREATING A NEW STANDARD



STANDARDS ENTERED AND ENTERING AN INVALID THICKNESS



VIEWING ALL CERTIFICATIONS



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
⊞	C1111111616	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

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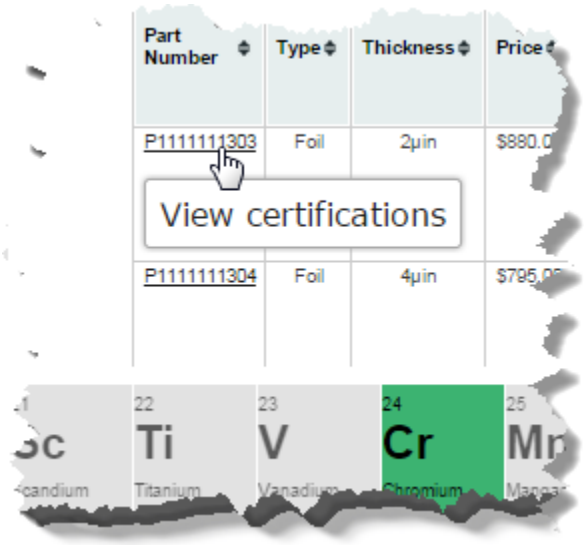
VIEW ALL CERTIFICATIONS FOR A SPECIFIC PART NUMBER



Find a Part | View Certifications

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

Find a Part | View Certifications

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.

DATA EXTRACT

Full "`SELECT *`" extracts for even the largest tables are available in a separate file.

SELECT * FROM tbElement

ATOMICNUMBER	DENSITY	NAME	SYMBOL
1	0.09	Hydrogen	H
2	0.18	Helium	He
3	0.54	Lithium	Li
4	1.85	Beryllium	Be
5	2.46	Boron	B
6	2.26	Carbon	C
7	1.25	Nitrogen	N

	8	1.43	Oxygen	O
	9	1.7	Fluorine	F
	10	0.9	Neon	Ne
	11	0.97	Sodium	Na
	12	1.74	Magnesium	Mg
	13	2.7	Aluminum	Al
	14	2.33	Silicon	Si
	15	1.82	Phosphorus	P
	16	1.96	Sulfur	S
	17	3.21	Chlorine	Cl
	18	1.78	Argon	Ar
	19	0.86	Potassium	K
	20	1.55	Calcium	Ca
	21	2.99	Scandium	Sc
	22	4.51	Titanium	Ti
	23	6.11	Vanadium	V

	24	7.14	Chromium	Cr
	25	7.47	Manganese	Mn
	26	7.87	Iron	Fe
	27	8.9	Cobalt	Co
	28	8.91	Nickel	Ni
	29	8.92	Copper	Cu
	30	7.14	Zinc	Zn
	31	5.9	Gallium	Ga
	32	5.32	Germanium	Ge
	33	5.73	Arsenic	As
	34	4.82	Selenium	Se
	35	3.12	Bromine	Br
	36	3.75	Krypton	Kr
	37	1.53	Rubidium	Rb
	38	2.63	Strontium	Sr
	39	4.47	Yttrium	Y
	40	6.51	Zirconium	Zr
	41	8.57	Niobium	Nb
	42	10.28	Molybdenum	Mo
	43	11.5	Technetium	Tc

	44	12.37	Ruthenium	Ru
	45	12.45	Rhodium	Rh
	46	12.02	Palladium	Pd
	47	10.49	Silver	Ag
	48	8.65	Cadmium	Cd
	49	7.31	Indium	In
	50	7.31	Tin	Sn
	51	6.7	Antimony	Sb
	52	6.24	Tellurium	Te
	53	4.94	Iodine	I
	54	0.01	Xenon	Xe
	55	1.88	Cesium	Cs
	56	3.51	Barium	Ba
	57	6.15	Lanthanum	La
	58	6.69	Cerium	Ce
	59	6.64	Praseodymium	Pr
	60	7.01	Neodymium	Nd
	61	7.26	Promethium	Pm
	62	7.35	Samarium	Sm
	63	5.24	Europium	Eu

	64	7.9	Gadolinium	Gd
	65	8.22	Terbium	Tb
	66	8.55	Dysprosium	Dy
	67	8.8	Holmium	Ho
	68	9.07	Erbium	Er
	69	9.32	Thulium	Tm
	70	6.57	Ytterbium	Yb
	71	9.84	Lutetium	Lu
	72	13.31	Hafnium	Hf
	73	16.65	Tantalum	Ta
	74	19.25	Tungsten	W
	75	21.02	Rhenium	Re
	76	22.61	Osmium	Os
	77	22.65	Iridium	Ir
	78	21.09	Platinum	Pt
	79	19.3	Gold	Au
	80	13.53	Mercury	Hg
	81	11.85	Thallium	Tl
	82	11.34	Lead	Pb
	83	9.78	Bismuth	Bi

84	9.2	Polonium	Po
85		Astatine	At
86	0.01	Radon	Rn
87		Francium	Fr
88	5	Radium	Ra
89	10.07	Actinium	Ac
90	11.72	Thorium	Th
91	15.37	Protactinium	Pa
92	19.05	Uranium	U
93	20.45	Neptunium	Np
94	19.82	Plutonium	Pu
95		Americium	Am
96	13.51	Curium	Cm
97	14.78	Berkelium	Bk
98	15.1	Californium	Cf
99		Einsteinium	Es
100		Fermium	Fm
101		Mendelevium	Md
102		Nobelium	No
103		Lawrencium	Lr

	104	Rutherfordium	Rf
	105	Dubnium	Db
	106	Seaborgium	Sg
	107	Bohrium	Bh
	108	Hassium	Hs
	109	Meitnerium	Mt
	110	Ununnilium	Uun
	111	Unununium	Uuu
	112	Ununbium	Uub
	113	Ununtrium	Uut
	114	Ununquadium	Uuq
	115	Ununpentium	Uup
	116	Ununhexium	Uuh
	117	Ununseptium	Uus
	118	Ununoctium	Uuo

```
SELECT * FROM tbCertStatus
```

STATUSDESC	STATUSID
Requested	R

In Progress	P
Complete	C
Canceled	X

SELECT * FROM tbTechnician

NAME	TECHNICIANID	TITLE
Dean Weaver	T01	Senior laboratory technician
Christine Bowers	T02	Senior laboratory technician
Clarence Washington	T03	Laboratory technician
Amber Cruz	T04	Laboratory technician
Lori Klein	T05	Laboratory technician

Israel Vargas	T06	Laboratory technician
Mitchell Fuller	T07	Laboratory technician
Charlotte Bowman	T08	Laboratory technician
Gary Phelps	T09	Junior laboratory technician
Alma Tucker	T10	Junior laboratory technician

```
SELECT * FROM tbStandardType
```

TYPEDESC	TYPEID
Foil	F
Infinite	I

Plated	P

SELECT * FROM tbCertification WHERE ROWNUM < 100 (to save space in this document)

CERTDATE	CERTNUMBER	STATUSID	TECHNICIANID
11/9/2013	C1111111290	R	T06
2/12/2014	C1111111292	C	T01
2/17/2014	C1111111294	C	T10
1/14/2014	C1111111296	C	T05
9/18/2013	C1111111298	C	T10
1/3/2014	C1111111300	C	T06
6/28/2014	C1111111302	C	T02

5/28/2013	C1111111304	P	T03
3/4/2014	C1111111306	C	T01
5/7/2013	C1111111308	C	T09
5/3/2013	C1111111310	R	T07
5/4/2014	C1111111312	C	T03
10/20/2013	C1111111314	C	T05
9/30/2014	C1111111316	C	T08
4/11/2013	C1111111318	P	T10
4/27/2014	C1111111320	C	T10
9/23/2013	C1111111322	C	T09
4/11/2013	C1111111324	R	T10
5/21/2013	C1111111326	C	T09
4/17/2014	C1111111328	C	T01
10/29/2013	C1111111330	C	T10
11/22/2013	C1111111332	R	T05
12/23/2014	C1111111334	C	T07

3/17/2014	C1111111336	R	T03
9/2/2013	C1111111338	R	T09
2/10/2014	C1111111340	R	T02
3/11/2014	C1111111342	R	T04
10/4/2014	C1111111344	R	T07
10/13/2013	C1111111346	C	T08
1/26/2014	C1111111348	C	T01
12/5/2014	C1111111350	R	T06
6/10/2014	C1111111352	R	T02
8/16/2013	C1111111354	R	T05
4/22/2013	C1111111356	C	T09
7/21/2013	C1111111358	R	T09
5/10/2014	C1111111360	C	T04
6/3/2014	C1111111362	X	T09
3/21/2014	C1111111364	C	T07
1/25/2014	C1111111366	R	T09
8/12/2013	C1111111368	C	T05
7/2/2014	C1111111370	P	T02
4/7/2013	C1111111372	R	T10
9/13/2014	C1111111374	R	T05

6/23/2013	C1111111376	C	T09
4/27/2014	C1111111378	R	T09
1/22/2014	C1111111380	P	T04
6/17/2014	C1111111382	R	T04
9/12/2014	C1111111384	C	T04
9/27/2014	C1111111386	R	T06
8/12/2013	C1111111388	P	T04
2/15/2014	C1111111390	R	T10
3/12/2014	C1111111392	C	T09
9/27/2014	C1111111394	P	T02
9/28/2014	C1111111396	C	T02
8/18/2013	C1111111398	C	T10
5/4/2013	C1111111400	P	T01
8/8/2014	C1111111402	R	T02
8/12/2013	C1111111404	R	T05
11/16/2014	C1111111406	R	T07
7/30/2014	C1111111408	C	T05
11/19/2014	C1111111410	P	T05
7/5/2013	C1111111412	C	T08
12/5/2013	C1111111414	C	T08

3/22/2014	C1111111416	P	T01
9/24/2014	C1111111418	C	T01
10/1/2013	C1111111420	R	T01
4/28/2014	C1111111422	R	T10
3/14/2014	C1111111424	P	T09
11/16/2014	C1111111426	R	T03
8/29/2014	C1111111428	C	T09
2/1/2014	C1111111430	C	T09
6/5/2013	C1111111432	C	T03
11/7/2014	C1111111434	R	T02
10/13/2014	C1111111436	C	T09
5/18/2014	C1111111438	P	T05
12/27/2013	C1111111440	C	T03
10/15/2014	C1111111442	C	T07
9/2/2013	C1111111444	C	T04
3/22/2014	C1111111446	P	T08
3/6/2014	C1111111448	C	T10
3/30/2014	C1111111450	R	T04
8/8/2014	C1111111452	P	T07
5/23/2014	C1111111454	C	T06

6/2/2014	C1111111456	C	T04
7/14/2014	C1111111458	C	T10
7/25/2014	C1111111460	R	T06
11/13/2013	C1111111462	C	T01
2/6/2014	C1111111464	R	T06
7/20/2013	C1111111466	P	T09
7/5/2013	C1111111468	C	T07
4/22/2013	C1111111470	P	T05
12/24/2013	C1111111472	R	T08
7/6/2013	C1111111474	R	T04
8/10/2013	C1111111476	C	T05
1/23/2014	C1111111478	R	T02
6/24/2013	C1111111480	C	T01
3/25/2014	C1111111482	C	T05
8/31/2013	C1111111484	C	T02
9/5/2013	C1111111486	P	T10
9/5/2014	C1111111488	R	T04

SELECT * FROM tbPart WHERE ROWNUM < 100 (to save space in this document)

CUSTOM	PARTNUMBER	PLATEDELEMENT	PRICE	STOCK	TARGETVALUE	TYPEID

N	P1111111111	640	308	2	F
N	P1111111112	575	43	4	F
N	P1111111113	520	83	10	F
N	P1111111114	465	25	20	F
N	P1111111115	420	74	40	F
N	P1111111116	380	78	80	F
N	P1111111117	340	56	120	F
N	P1111111118	305	31	160	F
N	P1111111119	275	78	200	F

N	P1111111120	250	52	240	F
N	P1111111121	225	85	280	F
N	P1111111122	200	12	320	F
N	P1111111123	180	85	360	F
N	P1111111124	165	17	400	F
N	P1111111125	145	76	440	F
N	P1111111126	130	52	480	F
N	P1111111127	120	78	520	F
N	P1111111128	105	3	560	F
N	P1111111129	95	3	600	F
N	P1111111130	85	32	640	F
N	P1111111131	80	75	680	F
N	P1111111132	70	63	720	F
N	P1111111133	65	93	760	F
N	P1111111134	55	36	800	F
N	P1111111135	995	30	2	F
N	P1111111136	895	6	4	F
N	P1111111137	805	36	10	F

N	P1111111138	725	94	20	F
N	P1111111139	655	88	40	F
N	P1111111140	590	79	80	F
N	P1111111141	530	90	120	F
N	P1111111142	475	18	160	F
N	P1111111143	430	6	200	F
N	P1111111144	385	55	240	F
N	P1111111145	345	15	280	F
N	P1111111146	310	76	320	F
N	P1111111147	280	99	360	F
N	P1111111148	255	17	400	F
N	P1111111149	230	15	440	F
N	P1111111150	205	15	480	F
N	P1111111151	185	89	520	F
N	P1111111152	165	15	560	F
N	P1111111153	150	6	600	F
N	P1111111154	135	74	640	F
N	P1111111155	120	17	680	F
N	P1111111156	110	80	720	F
N	P1111111157	100	12	760	F

N	P1111111158	90	55	800	F
N	P1111111159	650	5	2	F
N	P1111111160	585	14	4	F
N	P1111111161	525	96	10	F
N	P1111111162	475	22	20	F
N	P1111111163	425	88	40	F
N	P1111111164	385	64	80	F
N	P1111111165	345	42	120	F
N	P1111111166	310	75	160	F
N	P1111111167	280	4	200	F
N	P1111111168	250	56	240	F
N	P1111111169	225	73	280	F
N	P1111111170	205	94	320	F
N	P1111111171	185	9	360	F
N	P1111111172	165	52	400	F
N	P1111111173	150	59	440	F
N	P1111111174	135	35	480	F
N	P1111111175	120	92	520	F
N	P1111111176	110	51	560	F
N	P1111111177	100	89	600	F

N	P1111111178	90	76	640	F
N	P1111111179	80	83	680	F
N	P1111111180	70	15	720	F
N	P1111111181	65	79	760	F
N	P1111111182	60	64	800	F
N	P1111111183	855	77	2	F
N	P1111111184	770	69	4	F
N	P1111111185	690	46	10	F
N	P1111111186	620	10	20	F
N	P1111111187	560	13	40	F
N	P1111111188	505	44	80	F
N	P1111111189	455	55	120	F
N	P1111111190	410	73	160	F
N	P1111111191	365	7	200	F
N	P1111111192	330	49	240	F
N	P1111111193	295	11	280	F
N	P1111111194	270	81	320	F
N	P1111111195	240	81	360	F
N	P1111111196	215	61	400	F
N	P1111111197	195	38	440	F

N	P1111111198	175	61	480	F
N	P1111111199	160	51	520	F
N	P1111111200	140	23	560	F
N	P1111111201	130	20	600	F
N	P1111111202	115	14	640	F
N	P1111111203	105	30	680	F
N	P1111111204	95	40	720	F
N	P1111111205	85	48	760	F
N	P1111111206	75	76	800	F
N	P1111111207	1255	63	2	F
N	P1111111208	1130	11	4	F
N	P1111111209	1015	4	10	F
N	P1111111210	915	43	20	F

SELECT * FROM tbStandard WHERE ROWNUM < 100 (to save space in this document)

ACTUALVALUE	CERTNUMBER	PARTNUMBER	SERIALNUMBER	COMPOSITION	PARTNUMBER	SYMBOL
1.93	C1111187576	P1111111111	S1111111111	100	P1111111111	Al

2.04		P1111111111	S1111111112	100	P1111111112	Al
2.03	C1111187578	P1111111111	S1111111113	100	P1111111113	Al
1.8		P1111111111	S1111111114	100	P1111111114	Al
1.97	C1111187580	P1111111111	S1111111115	100	P1111111115	Al
2.07		P1111111111	S1111111116	100	P1111111116	Al
1.97	C1111187582	P1111111111	S1111111117	100	P1111111117	Al
1.98		P1111111111	S1111111118	100	P1111111118	Al
1.87	C1111187584	P1111111111	S1111111119	100	P1111111119	Al
2.08		P1111111111	S1111111120	100	P1111111120	Al

1.99	C1111187586	P1111111111	S1111111121	100	P1111111121	Al
2.01		P1111111111	S1111111122	100	P1111111122	Al
2.06	C1111187588	P1111111111	S1111111123	100	P1111111123	Al
1.84		P1111111111	S1111111124	100	P1111111124	Al
2.05	C1111187590	P1111111111	S1111111125	100	P1111111125	Al
1.99	C1111187624	P1111111111	S1111111126	100	P1111111126	Al
1.99	C1111187632	P1111111111	S1111111127	100	P1111111127	Al
1.98		P1111111111	S1111111128	100	P1111111128	Al
2.08	C1111187634	P1111111111	S1111111129	100	P1111111129	Al
2.08		P1111111111	S1111111130	100	P1111111130	Al
1.82	C1111187636	P1111111111	S1111111131	100	P1111111131	Al
1.88		P1111111111	S1111111132	100	P1111111132	Al
2.14	C1111187644	P1111111111	S1111111133	100	P1111111133	Al
2.1		P1111111111	S1111111134	100	P1111111134	Al
1.98	C1111187646	P1111111111	S1111111135	100	P1111111135	Ag
1.97		P1111111111	S1111111136	100	P1111111136	Ag
2.04		P1111111111	S1111111137	100	P1111111137	Ag
1.92		P1111111111	S1111111138	100	P1111111138	Ag
2.1		P1111111111	S1111111139	100	P1111111139	Ag
2.06		P1111111111	S1111111140	100	P1111111140	Ag

1.83	P1111111111	S1111111141	100	P1111111141	Ag
1.93	P1111111111	S1111111142	100	P1111111142	Ag
1.86	P1111111111	S1111111143	100	P1111111143	Ag
2.04	P1111111111	S1111111144	100	P1111111144	Ag
2.01	P1111111111	S1111111145	100	P1111111145	Ag
1.97	P1111111111	S1111111146	100	P1111111146	Ag
2.11	P1111111111	S1111111147	100	P1111111147	Ag
2.02	P1111111111	S1111111148	100	P1111111148	Ag
2	P1111111111	S1111111149	100	P1111111149	Ag
1.94	P1111111111	S1111111150	100	P1111111150	Ag
2.02	P1111111111	S1111111151	100	P1111111151	Ag
1.94	P1111111111	S1111111152	100	P1111111152	Ag
2.14	P1111111111	S1111111153	100	P1111111153	Ag
1.95	P1111111111	S1111111154	100	P1111111154	Ag
1.91	P1111111111	S1111111155	100	P1111111155	Ag
2.06	P1111111111	S1111111156	100	P1111111156	Ag
1.89	P1111111111	S1111111157	100	P1111111157	Ag
1.93	P1111111111	S1111111158	100	P1111111158	Ag
1.94	P1111111111	S1111111159	70	P1111111159	Ag
1.98	P1111111111	S1111111160	30	P1111111159	Cu

2.03	P1111111111	S1111111161	70	P1111111160	Ag
2.16	P1111111111	S1111111162	30	P1111111160	Cu
2.05	P1111111111	S1111111163	70	P1111111161	Ag
1.97	P1111111111	S1111111164	30	P1111111161	Cu
2.05	P1111111111	S1111111165	70	P1111111162	Ag
2.16	P1111111111	S1111111166	30	P1111111162	Cu
2.07	P1111111111	S1111111167	70	P1111111163	Ag
2.12	P1111111111	S1111111168	30	P1111111163	Cu
2.08	P1111111111	S1111111169	70	P1111111164	Ag
2.07	P1111111111	S1111111170	30	P1111111164	Cu
2.03	P1111111111	S1111111171	70	P1111111165	Ag
2.02	P1111111111	S1111111172	30	P1111111165	Cu
2.1	P1111111111	S1111111173	70	P1111111166	Ag
2.02	P1111111111	S1111111174	30	P1111111166	Cu
1.98	P1111111111	S1111111175	70	P1111111167	Ag
1.91	P1111111111	S1111111176	30	P1111111167	Cu
2.01	P1111111111	S1111111177	70	P1111111168	Ag
2.1	P1111111111	S1111111178	30	P1111111168	Cu
1.95	P1111111111	S1111111179	70	P1111111169	Ag
2.14	P1111111111	S1111111180	30	P1111111169	Cu

2.04	P1111111111	S1111111181	70	P1111111170	Ag
1.84	P1111111111	S1111111182	30	P1111111170	Cu
1.88	P1111111111	S1111111183	70	P1111111171	Ag
1.88	P1111111111	S1111111184	30	P1111111171	Cu
1.82	P1111111111	S1111111185	70	P1111111172	Ag
1.92	P1111111111	S1111111186	30	P1111111172	Cu
2.01	P1111111111	S1111111187	70	P1111111173	Ag
1.87	P1111111111	S1111111188	30	P1111111173	Cu
2.18	P1111111111	S1111111189	70	P1111111174	Ag
1.91	P1111111111	S1111111190	30	P1111111174	Cu
2.05	P1111111111	S1111111191	70	P1111111175	Ag
1.96	P1111111111	S1111111192	30	P1111111175	Cu
1.99	P1111111111	S1111111193	70	P1111111176	Ag
1.97	P1111111111	S1111111194	30	P1111111176	Cu
2.06	P1111111111	S1111111195	70	P1111111177	Ag
1.97	P1111111111	S1111111196	30	P1111111177	Cu
2.05	P1111111111	S1111111197	70	P1111111178	Ag
1.9	P1111111111	S1111111198	30	P1111111178	Cu
2.02	P1111111111	S1111111199	70	P1111111179	Ag
2.06	P1111111111	S1111111200	30	P1111111179	Cu

2.01	P1111111111	S1111111201	70	P1111111180	Ag
2	P1111111111	S1111111202	30	P1111111180	Cu
2.13	P1111111111	S1111111203	70	P1111111181	Ag
2.06	P1111111111	S1111111204	30	P1111111181	Cu
1.9	P1111111111	S1111111205	70	P1111111182	Ag
1.9	P1111111111	S1111111206	30	P1111111182	Cu
1.96	P1111111111	S1111111207	100	P1111111183	Au
1.86	P1111111111	S1111111208	100	P1111111184	Au
2.07	P1111111111	S1111111209	100	P1111111185	Au
1.95	P1111111111	S1111111211	100	P1111111186	Au

SELECT * FROM tbPartComponent WHERE ROWNUM < 100 (to save space in this document)

COMPOSITION	PARTNUMBER	SYMBOL
100	P1111111111	Al
100	P1111111112	Al
100	P1111111113	Al

	100	P1111111114	Al
	100	P1111111115	Al
	100	P1111111116	Al
	100	P1111111117	Al
	100	P1111111118	Al
	100	P1111111119	Al
	100	P1111111120	Al
	100	P1111111121	Al
	100	P1111111122	Al
	100	P1111111123	Al
	100	P1111111124	Al
	100	P1111111125	Al

	100	P1111111126	Al
	100	P1111111127	Al
	100	P1111111128	Al
	100	P1111111129	Al
	100	P1111111130	Al
	100	P1111111131	Al
	100	P1111111132	Al
	100	P1111111133	Al
	100	P1111111134	Al
	100	P1111111135	Ag
	100	P1111111136	Ag
	100	P1111111137	Ag
	100	P1111111138	Ag
	100	P1111111139	Ag
	100	P1111111140	Ag
	100	P1111111141	Ag
	100	P1111111142	Ag
	100	P1111111143	Ag
	100	P1111111144	Ag
	100	P1111111145	Ag

100	P1111111146	Ag
100	P1111111147	Ag
100	P1111111148	Ag
100	P1111111149	Ag
100	P1111111150	Ag
100	P1111111151	Ag
100	P1111111152	Ag
100	P1111111153	Ag
100	P1111111154	Ag
100	P1111111155	Ag
100	P1111111156	Ag
100	P1111111157	Ag
100	P1111111158	Ag
70	P1111111159	Ag
30	P1111111159	Cu
70	P1111111160	Ag
30	P1111111160	Cu
70	P1111111161	Ag
30	P1111111161	Cu
70	P1111111162	Ag

30	P1111111162	Cu
70	P1111111163	Ag
30	P1111111163	Cu
70	P1111111164	Ag
30	P1111111164	Cu
70	P1111111165	Ag
30	P1111111165	Cu
70	P1111111166	Ag
30	P1111111166	Cu
70	P1111111167	Ag
30	P1111111167	Cu
70	P1111111168	Ag
30	P1111111168	Cu
70	P1111111169	Ag
30	P1111111169	Cu
70	P1111111170	Ag
30	P1111111170	Cu
70	P1111111171	Ag
30	P1111111171	Cu
70	P1111111172	Ag

30	P1111111172	Cu
70	P1111111173	Ag
30	P1111111173	Cu
70	P1111111174	Ag
30	P1111111174	Cu
70	P1111111175	Ag
30	P1111111175	Cu
70	P1111111176	Ag
30	P1111111176	Cu
70	P1111111177	Ag
30	P1111111177	Cu
70	P1111111178	Ag
30	P1111111178	Cu
70	P1111111179	Ag
30	P1111111179	Cu
70	P1111111180	Ag
30	P1111111180	Cu
70	P1111111181	Ag
30	P1111111181	Cu
70	P1111111182	Ag

30	P1111111182	Cu
100	P1111111183	Au
100	P1111111184	Au
100	P1111111185	Au
100	P1111111186	Au

SELECT * FROM tbStandardComponent WHERE ROWNUM < 100 (to save space in this document)

COMPOSITION	PARTNUMBER	SERIALNUMBER	SYMBOL
100	P1111111111	S1111111111	Al
100	P1111111111	S1111111112	Al
100	P1111111111	S1111111113	Al
100	P1111111111	S1111111114	Al
100	P1111111111	S1111111115	Al

	100	P1111111111	S1111111116	Al
	100	P1111111111	S1111111117	Al
	100	P1111111111	S1111111118	Al
	100	P1111111111	S1111111119	Al
	100	P1111111111	S1111111120	Al
	100	P1111111111	S1111111121	Al
	100	P1111111111	S1111111122	Al
	100	P1111111111	S1111111123	Al
	100	P1111111111	S1111111124	Al
	100	P1111111111	S1111111125	Al
	100	P1111111111	S1111111126	Al
	100	P1111111111	S1111111127	Al
	100	P1111111111	S1111111128	Al
	100	P1111111111	S1111111129	Al

	100	P1111111111	S1111111130	Al
	100	P1111111111	S1111111131	Al
	100	P1111111111	S1111111132	Al
	100	P1111111111	S1111111133	Al
	100	P1111111111	S1111111134	Al
	100	P1111111111	S1111111135	Al
	100	P1111111111	S1111111136	Al
	100	P1111111111	S1111111137	Al
	100	P1111111111	S1111111138	Al
	100	P1111111111	S1111111139	Al
	100	P1111111111	S1111111140	Al
	100	P1111111111	S1111111141	Al
	100	P1111111111	S1111111142	Al
	100	P1111111111	S1111111143	Al
	100	P1111111111	S1111111144	Al
	100	P1111111111	S1111111145	Al
	100	P1111111111	S1111111146	Al
	100	P1111111111	S1111111147	Al
	100	P1111111111	S1111111148	Al
	100	P1111111111	S1111111149	Al

100	P1111111111	S1111111150	Al
100	P1111111111	S1111111151	Al
100	P1111111111	S1111111152	Al
100	P1111111111	S1111111153	Al
100	P1111111111	S1111111154	Al
100	P1111111111	S1111111155	Al
100	P1111111111	S1111111156	Al
100	P1111111111	S1111111157	Al
100	P1111111111	S1111111158	Al
100	P1111111111	S1111111159	Al
100	P1111111111	S1111111160	Al
100	P1111111111	S1111111161	Al
100	P1111111111	S1111111162	Al
100	P1111111111	S1111111163	Al
100	P1111111111	S1111111164	Al
100	P1111111111	S1111111165	Al
100	P1111111111	S1111111166	Al
100	P1111111111	S1111111167	Al
100	P1111111111	S1111111168	Al
100	P1111111111	S1111111169	Al

100	P1111111111	S1111111170	Al
100	P1111111111	S1111111171	Al
100	P1111111111	S1111111172	Al
100	P1111111111	S1111111173	Al
100	P1111111111	S1111111174	Al
100	P1111111111	S1111111175	Al
100	P1111111111	S1111111176	Al
100	P1111111111	S1111111177	Al
100	P1111111111	S1111111178	Al
100	P1111111111	S1111111179	Al
100	P1111111111	S1111111180	Al
100	P1111111111	S1111111181	Al
100	P1111111111	S1111111182	Al
100	P1111111111	S1111111183	Al
100	P1111111111	S1111111184	Al
100	P1111111111	S1111111185	Al
100	P1111111111	S1111111186	Al
100	P1111111111	S1111111187	Al
100	P1111111111	S1111111188	Al
100	P1111111111	S1111111189	Al

100	P1111111111	S1111111190	Al
100	P1111111111	S1111111191	Al
100	P1111111111	S1111111192	Al
100	P1111111111	S1111111193	Al
100	P1111111111	S1111111194	Al
100	P1111111111	S1111111195	Al
100	P1111111111	S1111111196	Al
100	P1111111111	S1111111197	Al
100	P1111111111	S1111111198	Al
100	P1111111111	S1111111199	Al
100	P1111111111	S1111111200	Al
100	P1111111111	S1111111201	Al
100	P1111111111	S1111111202	Al
100	P1111111111	S1111111203	Al
100	P1111111111	S1111111204	Al
100	P1111111111	S1111111205	Al
100	P1111111111	S1111111206	Al
100	P1111111111	S1111111207	Al
100	P1111111111	S1111111208	Al
100	P1111111111	S1111111209	Al

	100	P1111111111	S1111111211	Al