

PATENT ASSIGNMENT COVER SHEET

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Stylesheet Version v1.2

EPAS ID: PAT5437731

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT
CONVEYING PARTY DATA	
Name	Execution Date
MEGASTIR TECHNOLOGIES LLC	12/03/2018
RECEIVING PARTY DATA	
Name:	MAZAK CORPORATION
Street Address:	8025 PRODUCTION DRIVE
City:	FLORENCE
State/Country:	KENTUCKY
Postal Code:	41022
PROPERTY NUMBERS Total: 113	
Property Type	Number
Application Number:	10265084
Application Number:	60327198
PCT Number:	US2002031717
Patent Number:	7494040
Application Number:	60506685
PCT Number:	US2004031581
Application Number:	11901707
Patent Number:	7270257
Application Number:	60443801
PCT Number:	US2004002836
Patent Number:	7530486
Application Number:	60467875
PCT Number:	US2004013957
Application Number:	13669219
Patent Number:	7152776
Patent Number:	7661572
Patent Number:	7993575
Patent Number:	8302834
Patent Number:	9061370
Patent Number:	7608296

PATENT

Property Type	Number
Patent Number:	6732901
Application Number:	60297738
PCT Number:	US2002018774
Patent Number:	7225968
Application Number:	60492374
PCT Number:	US2004025345
Application Number:	11700724
Application Number:	60573703
Application Number:	60763950
PCT Number:	US2007002735
Application Number:	60573707
Patent Number:	8550326
Patent Number:	8056797
Patent Number:	7651018
Application Number:	60616455
PCT Number:	US2005035901
Patent Number:	6648206
PCT Number:	US2001015084
Patent Number:	7124929
Patent Number:	6779704
Application Number:	60202665
PCT Number:	US2001015083
Application Number:	10846825
Application Number:	60469964
Application Number:	10843208
PCT Number:	US2012065188
Application Number:	11311929
Application Number:	60637223
PCT Number:	US2005046034
Application Number:	60463849
Application Number:	11355514
Application Number:	60653158
PCT Number:	US2006005507
Patent Number:	7753252
Application Number:	60678244
Patent Number:	7992759
Application Number:	60689281
PCT Number:	US2006022887

Property Type	Number
Patent Number:	8157154
Patent Number:	7845545
Application Number:	60804628
Application Number:	60816396
PCT Number:	US2007014004
Patent Number:	8241556
Application Number:	61087916
PCT Number:	US2009004616
Patent Number:	8469256
Application Number:	61088001
Patent Number:	7909231
PCT Number:	US2009004617
Patent Number:	9242308
Application Number:	12938004
Application Number:	61257049
PCT Number:	US2010002884
Patent Number:	8490855
Patent Number:	8317080
Application Number:	61369923
Application Number:	14017023
Application Number:	13196737
Application Number:	61369934
PCT Number:	US2011046321
Patent Number:	9352425
Patent Number:	8910851
Application Number:	61536959
PCT Number:	US2012056404
Application Number:	13731489
Application Number:	61581955
PCT Number:	US2012072290
Patent Number:	9764375
PCT Number:	US2015011133
Application Number:	13783740
Application Number:	61606218
PCT Number:	US2013028815
Patent Number:	9061371
Application Number:	61646872
PCT Number:	US2013041005

Property Type	Number
Application Number:	13894226
Application Number:	61646880
PCT Number:	US2013041000
Application Number:	15324850
Application Number:	62023166
Application Number:	15324866
Application Number:	62084432
Application Number:	62404932
Application Number:	62667043
Application Number:	16115188
Application Number:	62552199
Application Number:	15719731
Application Number:	62589020
Application Number:	16115195
Application Number:	62552769
Application Number:	62668946
Application Number:	16189022

CORRESPONDENCE DATA

Fax Number:

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Email: Rblaskie@fitcheven.com

Correspondent Name: FITCH EVEN TABIN & FLANNERY, LLP

Address Line 1: 120 S LA SALLE ST.

Address Line 2: SUITE 2100

Address Line 4: CHICAGO, ILLINOIS 60603

NAME OF SUBMITTER: JONATHAN H. URBANEK

SIGNATURE: /Jonathan H. Urbanek/

DATE SIGNED: 03/25/2019

Total Attachments: 17

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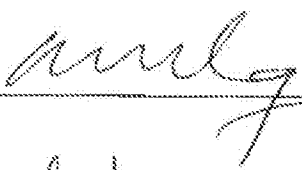
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PATENT ASSIGNMENT

MEGASTIR TECHNOLOGIES LLC, a Delaware limited liability company, having a principal place of business at 1952 East Ironton Boulevard, Provo, Utah 84606, United States of America ("Assignor"), for good and valuable consideration, receipt and sufficiency of which is hereby acknowledged, has assigned and does hereby assign and sell, which confirms any previous assignment by Assignor or by operation of law, to MAZAK CORPORATION, a New York corporation, having a principal place of business at 8025 Production Drive, Florence, Kentucky 41022, United States of America ("Assignee") its entire right, title and interest, in and to all inventions, subject matter, and improvements disclosed in the patents and applications set forth in the attached APPENDIX, and in and to all patent and all patent convention and treaty rights of all kinds, including the right to claim priority from said applications, and all rights in and to any utility model, continuation, continuation-in-part, and divisional application therefrom, and any reissue or re-examination as to any patent issuing therefrom, in all countries throughout the world, for all such subject matter described therein, including all rights of action and rights to recover damages for past infringements (collectively the "Rights").

Assignor agrees that on request, at Assignee's sole expense, and without further consideration, Assignor will make all rightful oaths, sign all lawful papers, and execute all instruments or documents required or reasonably requested for the making and prosecution of any applications for any type of patent, utility model, or other similar rights in all countries including, but not limited to, any provisional, non-provisional, continuation, continuation-in-part, divisional, renewal or substitute thereof, for any derivation proceedings relating thereto, and, as to any patents that issue from such applications, or reissue, re-examination, or extension thereof, and generally do everything reasonably required to aid the Assignee, its successors, assigns, and nominees to perfect their ownership of the Rights.

MEGASTIR TECHNOLOGIES LLC

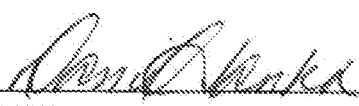

Name

President
Title

Dec 03, 2018
Date

Accepted by Assignee:
Mazak Corporation

MAZAK CORPORATION


Name

DANIEL JANKA
Title

12/4/2018
Date

APPENDIX

Patents and Patent Applications

Title	Patent or App. No.	Issue Date	Filing Date	Country
Method And Apparatus For Friction Stir Welding	10/265084		04 Oct 2002	United States
Method And Apparatus For Friction Stir Welding	60/327188		04 Oct 2001	United States
Method And Apparatus For Friction Stir Welding	PCT/US2002/031717		04 Oct 2002	WIPO
Friction Stir Welding Improvements For Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	04789072.8		10 Feb 2008	European Patent Office
Friction Stir Welding Improvements For Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	7494040	24 Feb 2009	27 Sep 2004	United States
Friction Stir Welding Improvements For Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	60/508685		25 Sep 2003	United States
Friction Stir Welding Improvements For Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	PCT/US2004/031581		04 Aug 2004	WIPO
Out-Of-Position Friction Stir Welding Of High Melting Temperature Alloys	2514913	18 Nov 2014	30 Jan 2004	Canada
Out-Of-Position Friction Stir Welding Of High Melting Temperature Alloys	04707108.5		30 Jan 2004	European Patent Office
Out-Of-Position Friction Stir Welding Of High Melting Temperature Alloys	PCT/US2004/002836		30 Jan 2004	Japan
Out-Of-Position Friction Stir Welding Of High Melting Temperature Alloys	11/901707		18 Sep 2007	United States
Out-Of-Position Friction Stir Welding Of High Melting Temperature Alloys	7270257	18 Sep 2007	30 Jan 2004	United States
Out-Of-Position Friction Stir Welding Of High Melting Temperature Alloys	60/443801		30 Jan 2003	United States
Out-Of-Position Friction Stir Welding Of High Melting Temperature Alloys	PCT/US2004/002836		30 Jan 2004	WIPO

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Title	Patent or App. No.	Issue Date	Filing Date	Country
Out-Of-Position Friction Stir Welding Of High Melting Temperature Alloys	2005/6256	29 Jul 2008	30 Jan 2004	South Africa
Applications Of Friction Stir Welding Using A Superabrasive Tool	0		00 Jan 1900	European Patent Office
Applications Of Friction Stir Welding Using A Superabrasive Tool	7630466	12 May 2008	05 May 2004	United States
Applications Of Friction Stir Welding Using A Superabrasive Tool	80/467875		05 May 2003	United States
Applications Of Friction Stir Welding Using A Superabrasive Tool	PCT/US2004/013957		05 May 2004	WIPO
Friction Stir Welding Using A Superabrasive Tool	2408489	20 Jan 2009	08 May 2001	Canada
Friction Stir Welding Using A Superabrasive Tool	200510803703.0	01 Aug 2007	08 May 2001	China
Friction Stir Welding Using A Superabrasive Tool	01809150.4	02 Mar 2005	08 May 2001	China
Friction Stir Welding Using A Superabrasive Tool	60134777.3	09 Jul 2006	08 May 2001	Germany
Friction Stir Welding Using A Superabrasive Tool	1345729	09 Jul 2008	08 May 2001	European Patent Office
Friction Stir Welding Using A Superabrasive Tool	1345729	08 Jul 2008	08 May 2001	France
Friction Stir Welding Using A Superabrasive Tool	1345728	09 Jul 2008	08 May 2001	United Kingdom
Friction Stir Welding Using A Superabrasive Tool	4627359	22 Sep 2011	08 May 2001	Japan
Friction Stir Welding Using A Superabrasive Tool	815654	14 Mar 2008	08 May 2001	South Korea
Friction Stir Welding Using A Superabrasive Tool	260553	15 Sep 2008	08 May 2001	Mexico
Friction Stir Welding Using A Superabrasive Tool	1345729	09 Jul 2008	08 May 2001	Sweden
Friction Stir Welding Using A Superabrasive Tool	13/669218		05 Nov 2012	United States
Friction Stir Welding Using A Superabrasive Tool	7152776	26 Dec 2006	10 Nov 2003	United States
Friction Stir Welding Using A Superabrasive Tool	7681572	16 Feb 2010	12 Dec 2008	United States
Friction Stir Welding Using A Superabrasive Tool	7893575	09 Aug 2011	16 Feb 2010	United States
Friction Stir Welding Using A Superabrasive Tool	8302834	06 Nov 2012	09 Aug 2011	United States
Friction Stir Welding Using A Superabrasive Tool	9061370	23 Jun 2016	11 Oct 2013	United States

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Title	Patent or App. No.	Issue Date	Filing Date	Country
Anvil For Friction Stir Welding High Temperature Materials	7808298	27 Oct 2009	13 Mar 2006	United States
Anvil For Friction Stir Welding High Temperature Materials	6732801	11 May 2004	11 Jun 2002	United States
Anvil For Friction Stir Welding High Temperature Materials	60/297738		12 Jun 2001	United States
Anvil For Friction Stir Welding High Temperature Materials	PCT/US2002/018774		12 Jun 2002	WIPO
Anvil For Friction Stir Welding High Temperature Materials	2003/9839	23 Feb 2005	12 Jun 2002	South Africa
Crack Repair Using Friction Stir Welding On Materials Including Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys	04821558.0		04 Aug 2004	European Patent Office
Crack Repair Using Friction Stir Welding On Materials Including Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys	4918879	03 Feb 2012	04 Aug 2004	Japan
Crack Repair Using Friction Stir Welding On Materials Including Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys	7225068	05 Jun 2007	04 Aug 2004	United States
Crack Repair Using Friction Stir Welding On Materials Including Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys	60/492374		04 Aug 2003	United States
Crack Repair Using Friction Stir Welding On Materials Including Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys	PCT/US2004/025345		04 Aug 2004	WIPO
Thermally Enhanced Tool For Friction Stirring	PCT/US2007/002735		31 Jan 2007	Canada
Thermally Enhanced Tool For Friction Stirring	PCT/US2007/002735		31 Jan 2007	China
Thermally Enhanced Tool For Friction Stirring	07782816.2		31 Jan 2007	European Patent Office
Thermally Enhanced Tool For Friction Stirring	PCT/US2007/002735		31 Jan 2007	Japan
Thermally Enhanced Tool For Friction Stirring	11/700724		31 Jan 2007	United States
Thermally Enhanced Tool For Friction Stir Welding	60/573703		21 May 2004	United States
Thermally Enhanced Tool For Friction Stir Welding	60/763950		31 Jan 2006	United States
Thermally Enhanced Tool For Friction Stirring	PCT/US2007/002735		31 Jan 2007	WIPO

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Title	Patent or App. No.	Issue Date	Filing Date	Country
Microstructure And Hardness Modification Of Cutting And Wear Surfaces Through Friction Stir Welding And Friction Stir Processing Including Friction Mixing	80/673,707		21 May 2004	United States
Expandable Mandrel For Use In Friction Stir Welding	2582732	11 Sep 2012	05 Oct 2005	Canada
Expandable Mandrel For Use In Friction Stir Welding	200580038466.1	27 Jan 2010	05 Oct 2005	China
Expandable Mandrel For Use In Friction Stir Welding	1788865	06 Jun 2012	05 Oct 2005	Germany
Expandable Mandrel For Use In Friction Stir Welding	1788865	06 Jun 2012	05 Oct 2005	Denmark
Expandable Mandrel For Use In Friction Stir Welding	1788865	06 Jun 2012	05 Oct 2005	European Patent Office
Expandable Mandrel For Use In Friction Stir Welding	1788865	06 Jun 2012	05 Oct 2005	France
Expandable Mandrel For Use In Friction Stir Welding	1788865	06 Jun 2012	05 Oct 2005	United Kingdom
Expandable Mandrel For Use In Friction Stir Welding	1788865	06 Jun 2012	05 Oct 2005	Italy
Expandable Mandrel For Use In Friction Stir Welding	4897888	06 Jan 2012	05 Oct 2005	Japan
Expandable Mandrel For Use In Friction Stir Welding	1148275	10 May 2012	05 Oct 2005	South Korea
Expandable Mandrel For Use In Friction Stir Welding	286302	04 May 2011	05 Oct 2005	Mexico
Expandable Mandrel For Use In Friction Stir Welding	1788865	06 Jun 2012	05 Oct 2005	Netherlands
Expandable Mandrel For Use In Friction Stir Welding	8550326	08 Oct 2013	15 Nov 2011	United States
Expandable Mandrel For Use In Friction Stir Welding	8056787	15 Nov 2011	28 Jan 2010	United States
Expandable Mandrel For Use In Friction Stir Welding	7851018	26 Jan 2010	05 Oct 2005	United States
Expandable Mandrel For Use In Friction Stir Welding	80/816455		05 Oct 2004	United States
Expandable Mandrel For Use In Friction Stir Welding	PCT/US2005/035901		05 Oct 2005	WIPO

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Title	Patent or App. No.	Issue Date	Filing Date	Country
Friction Stir Welding Using A Superabrasive Tool	6848206	18 Nov 2003	08 May 2001	United States
Friction Stir Welding Using A Superabrasive Tool	PCT/US2001/015084		08 May 2001	WIPO
Friction Stir Welding Using A Superabrasive Tool	2002/6785	28 Apr 2004	08 May 2001	South Africa
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	2408485	13 Jan 2008	08 May 2001	Canada
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	200510003704.6	24 Oct 2007	28 Jan 2005	China
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	01811047.9	02 Mar 2005	08 May 2001	China
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	1341637	09 Jul 2008	08 May 2001	Germany
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	1341637	08 Jul 2008	08 May 2001	European Patent Office
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	1341637	08 Jul 2008	08 May 2001	France
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	1341637	08 Jul 2008	08 May 2001	United Kingdom
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	4545368	08 Jul 2010	08 May 2001	Japan
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	815653	14 Mar 2000	08 May 2001	South Korea
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	263360	19 Dec 2008	08 May 2001	Mexico

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Title	Patent or App. No.	Issue Date	Filing Date	Country
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	1341637	09 Jul 2008	08 May 2001	Sweden
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	7124928	24 Oct 2008	10 Nov 2003	United States
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	6779704	24 Aug 2004	08 May 2001	United States
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	60/202665		08 May 2000	United States
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	PCT/US2001/015083		08 May 2001	WIPO
Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys Using A Superabrasive Tool	2002/8786	28 Apr 2004	08 May 2001	South Africa
Control System Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys	10/846825		13 May 2004	United States
Control System Friction Stir Welding Of Metal Matrix Composites, Ferrous Alloys, Non-Ferrous Alloys, And Superalloys	60/468864		13 May 2003	United States
Anvil For Friction Stir Welding High Temperature Materials	2448972	12 Feb 2013	12 Jun 2002	Canada
Anvil For Friction Stir Welding High Temperature Materials	02811616 2	14 Mar 2007	12 Jun 2002	China
Anvil For Friction Stir Welding High Temperature Materials	02778984.3		11 Jun 2002	European Patent Office
Anvil For Friction Stir Welding High Temperature Materials	4322864	12 Jun 2009	12 Jun 2002	Japan
Anvil For Friction Stir Welding High Temperature Materials	0885433	20 Oct 2008	12 Jun 2002	South Korea
Anvil For Friction Stir Welding High Temperature Materials	262862	08 Dec 2008	12 Jun 2002	Mexico
Anvil For Friction Stir Welding High Temperature Materials	10/843208		11 May 2004	United States

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Title	Patent or App. No.	Issue Date	Filing Date	Country
Expandable Mandrel For Use In Friction Stir Welding	PCT/US2012/085188		15 Nov 2012	WIPO
Expandable Mandrel For Use In Friction Stir Welding	PCT/US2005/035901		05 Oct 2005	South Africa
Single Body Saw Tool For High Melting Temperature Materials	PCT/US2005/046034		19 Dec 2005	European Patent Office
Single Body Saw Tool For High Melting Temperature Materials	11/311929		19 Dec 2005	United States
Single Body Saw Tool For High Melting Temperature Materials	60/837223		17 Dec 2004	United States
Single Body Saw Tool For High Melting Temperature Materials	PCT/US2005/046034		19 Dec 2005	WIPO
Integrated Load And Temperature System For Friction Stir Welding	60/463849		16 Apr 2003	United States
Tool Geometries For Friction Stir Spot Welding Of High Melting Temperature Alloys	PCT/US2006/005507		15 Feb 2006	Canada
Tool Geometries For Friction Stir Spot Welding Of High Melting Temperature Alloys	06848719.7		15 Feb 2006	European Patent Office
Tool Geometries For Friction Stir Spot Welding Of High Melting Temperature Alloys	2007556284		15 Feb 2006	Japan
Tool Geometries For Friction Stir Spot Welding Of High Melting Temperature Alloys	11/355514		16 Feb 2006	United States
Tool Geometries For Friction Stir Spot Welding Of High Melting Temperature Alloys	60/653168		15 Feb 2005	United States
Tool Geometries For Friction Stir Spot Welding Of High Melting Temperature Alloys	PCT/US2006/005507		16 Feb 2006	WIPO
Method For Construction Of Pressure Vessels With A Liner Using Friction Stirring Processes	7753252	13 Jul 2010	05 May 2006	United States
Method For Construction Of Pressure Vessels With A Liner Using Friction Stirring Processes	60/078244		06 May 2006	United States
Friction Stirring Of High Softening Temperature Materials Using New Surface Features On A Tool	7992759	08 Aug 2011	12 Jun 2006	United States
Friction Stir Welding/Friction Stir Processing Tool Geometries For Improved Performance In Metal Matrix Composites, Ferrous, And Nonferrous Alloys	60/688281		10 Jun 2005	United States

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Title	Patent or App. No.	Issue Date	Filing Date	Country
Friction Stir Welding/Friction Stir Processing Tool Geometries For Improved Performance In Metal Matrix Composites, Ferrous, And Nonferrous Alloys	PCT/US2006/022087		12 Jun 2006	WIPO
Three-Body Joining Using Friction Stir Processing Techniques	2663281	02 Jun 2015	13 Jun 2007	Canada
Three-Body Joining Using Friction Stir Processing Techniques	200760021953.4	04 Apr 2012	13 Jun 2007	China
Three-Body Joining Using Friction Stir Processing Techniques	602007019723.6	28 Dec 2011	13 Jun 2007	Germany
Three-Body Joining Using Friction Stir Processing Techniques	2026929	28 Dec 2011	13 Jun 2007	Denmark
Three-Body Joining Using Friction Stir Processing Techniques	2026929	28 Dec 2011	13 Jun 2007	European Patent Office
Three-Body Joining Using Friction Stir Processing Techniques	2026929	28 Dec 2011	13 Jun 2007	Finland
Three-Body Joining Using Friction Stir Processing Techniques	2026929	28 Dec 2011	13 Jun 2007	France
Three-Body Joining Using Friction Stir Processing Techniques	2026929	28 Dec 2011	13 Jun 2007	United Kingdom
Three-Body Joining Using Friction Stir Processing Techniques	2026929	28 Dec 2011	13 Jun 2007	Italy
Three-Body Joining Using Friction Stir Processing Techniques	5167254	28 Dec 2012	13 Jun 2007	Japan
Three-Body Joining Using Friction Stir Processing Techniques	2026929	28 Dec 2011	13 Jun 2007	Norway
Three-Body Joining Using Friction Stir Processing Techniques	2026929	28 Dec 2011	13 Jun 2007	Sweden
Three-Body Joining Using Friction Stir Processing Techniques	6157154	17 Apr 2012	07 Dec 2010	United States
Three-Body Joining Using Friction Stir Processing Techniques	7845545	07 Dec 2010	13 Jun 2007	United States

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Title	Patent or App. No.	Issue Date	Filing Date	Country
Three-Body Joining Using Friction Stir Processing Techniques	60/804628		13 Jun 2006	United States
Three-Body Joining Using Friction Stir Processing Techniques	60/816398		23 Jun 2006	United States
Three-Body Joining Using Friction Stir Processing Techniques	PCT/US2007/014004		13 Jun 2007	WIPO
Rotary Holding Device For Gripping Tool Material At Elevated Temperatures Through Multiple Collar Assembly	PCT/US2009/004618		11 Aug 2009	Brazil
Rotary Holding Device For Gripping Tool Material At Elevated Temperatures Through Multiple Collar Assembly	2733025	29 Dec 2015	11 Aug 2009	Canada
Rotary Holding Device For Gripping Tool Material At Elevated Temperatures Through Multiple Collar Assembly	200980135791.8	07 Oct 2015	11 Aug 2009	China
Rotary Holding Device For Gripping Tool Material At Elevated Temperatures Through Multiple Collar Assembly	09806965.1		11 Aug 2009	European Patent Office
Rotary Holding Device For Gripping Tool Material At Elevated Temperatures Through Multiple Collar Assembly	PCT/US2008/004618		11 Aug 2008	United Kingdom
Rotary Holding Device For Gripping Tool Material At Elevated Temperatures Through Multiple Collar Assembly	5607049	06 Sep 2014	11 Aug 2009	Japan
Rotary Holding Device For Gripping Tool Material At Elevated Temperatures Through Multiple Collar Assembly	PCT/US2009/004818		11 Aug 2008	South Korea
Rotary Holding Device For Gripping Tool Material At Elevated Temperatures Through Multiple Collar Assembly	PCT/US2009/004618		11 Aug 2008	Mexico
Rotary Holding Device For Gripping Tool Material At Elevated Temperatures Through Multiple Collar Assembly	8241556	14 Aug 2012	11 Aug 2009	United States

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Title	Patent or App. No.	Issue Date	Filing Date	Country
Rotary Holding Device For Gripping Tool Material At Elevated Temperatures Through Multiple Collar Assembly	61/087816		11 Aug 2008	United States
Rotary Holding Device For Gripping Tool Material At Elevated Temperatures Through Multiple Collar Assembly	PCT/US2009/004616		11 Aug 2009	WIPO
Rotary Holding Device For Gripping Tool Material At Elevated Temperatures Through Multiple Collar Assembly	PCT/US2009/004616		11 Aug 2009	South Africa
A Method For Using A Non-Linear Control Parameter Ramp Profile To Approach A Temperature Set Point Of A Tool Or Weld That Prevents Temperature Overshoot During Friction Stir Welding	8469258	25 Jun 2013	13 Dec 2011	United States
A Method For Using Modifiable Tool Control Parameters To Control The Temperature Of The Tool During Friction Stir Welding	2733178	24 May 2016	11 Aug 2009	Canada
A Method For Using Modifiable Tool Control Parameters To Control The Temperature Of The Tool During Friction Stir Welding	200980135793.5	02 Apr 2014	11 Aug 2009	China
A Method For Using Modifiable Tool Control Parameters To Control The Temperature Of The Tool During Friction Stir Welding	09808866.9		11 Aug 2009	European Patent Office
A Method For Using Modifiable Tool Control Parameters To Control The Temperature Of The Tool During Friction Stir Welding	5739804	01 May 2016	11 Aug 2009	Japan
A Method For Using Modifiable Tool Control Parameters To Control The Temperature Of The Tool During Friction Stir Welding	61/088001		11 Aug 2008	United States
A Method For Using Modifiable Tool Control Parameters To Control The Temperature Of The Tool During Friction Stir Welding	7909231	22 Mar 2011	11 Aug 2009	United States
A Method For Using Modifiable Tool Control Parameters To Control The Temperature Of The Tool During Friction Stir Welding	61/088001		11 Aug 2008	United States

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A Method For Using Modifiable Tool Control Parameters To Control The Temperature Of The Tool During Friction Stir Welding	PCT/US2009/004617		11 Aug 2009	WIPO
Out Of Position Friction Stir Welding Of Casing And Smaller Diameter Tubing Or Pipe	112012010352.0		02 Nov 2010	Brazil
Out Of Position Friction Stir Welding Of Casing And Smaller Diameter Tubing Or Pipe	2779075	10 May 2016	02 Nov 2010	Canada
Out Of Position Friction Stir Welding Of Casing And Smaller Diameter Tubing Or Pipe	10827262.4		02 Nov 2010	European Patent Office
Out Of Position Friction Stir Welding Of Casing And Smaller Diameter Tubing Or Pipe	2014116679		05 Jun 2014	Japan
Out Of Position Friction Stir Welding Of Casing And Smaller Diameter Tubing Or Pipe	2012636794		02 Nov 2010	Japan
Out Of Position Friction Stir Welding Of Casing And Smaller Diameter Tubing Or Pipe	1648792	25 Aug 2015	02 Nov 2010	South Korea
Out Of Position Friction Stir Welding Of Casing And Smaller Diameter Tubing Or Pipe	2012005042		02 Nov 2010	Mexico
Out Of Position Friction Stir Welding Of Casing And Smaller Diameter Tubing Or Pipe	9242308	26 Jan 2016	16 Apr 2014	United States
Out Of Position Friction Stir Welding Of Casing And Smaller Diameter Tubing Or Pipe	12/936004		02 Nov 2010	United States
Out Of Position Friction Stir Welding Of Casing And Smaller Diameter Tubing Or Pipe	61/257049		02 Nov 2009	United States
Out Of Position Friction Stir Welding Of Casing And Smaller Diameter Tubing Or Pipe	PCT/US2010/002884		02 Nov 2010	WIPO
Methods To Fabricate Fully Enclosed Hollow Structures Using Friction Stir Welding	8490855	23 Jul 2013	27 Nov 2012	United States
Methods To Fabricate Fully Enclosed Hollow Structures Using Friction Stir Welding	8317080	27 Nov 2012	02 Aug 2011	United States
Methods To Fabricate Fully Enclosed Hollow Structures Using Friction Stir Welding	81/369923		02 Aug 2010	United States

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System For Using High Rotary Speed For Minimizing The Load During Friction Stir	201180042605.1		02 Aug 2011	China
System For Using High Rotary Speed For Minimizing The Load During Friction Stir	11815220.6		02 Aug 2011	European Patent Office
System For Using High Rotary Speed For Minimizing The Load During Friction Stir	2013-523287		02 Aug 2011	Japan
System For Using High Rotary Speed For Minimizing The Load During Friction Stir Welding	10-2013-7005173	23 Jan 2015	02 Aug 2011	South Korea
System For Using High Rotary Speed For Minimizing The Load During Friction Stir Welding	14/017023		03 Sep 2013	United States
System For Using High Rotary Speed For Minimizing The Load During Friction Stir	13/188737		02 Aug 2011	United States
System For Using High Rotary Speed For Minimizing The Load During Friction Stir	81/368934		02 Aug 2010	United States
System For Using High Rotary Speed For Minimizing The Load During Friction Stir Welding	PCT/US2011/046321		02 Aug 2011	WIPO
Material Surface Modification Using Friction Stir Welding Hybrid Process	9382426	31 May 2016	16 Dec 2014	United States
Material Surface Modification Using Friction Stir Welding Hybrid Process	8910851	16 Dec 2014	20 Sep 2012	United States
Material Surface Modification Using Friction Stir Welding Hybrid Process	81/538859		20 Sep 2011	United States
Material Surface Modification Using Friction Stir Welding Hybrid Process	PCT/US2012/058404		20 Sep 2012	WIPO
System And Method for Holding Materials Having Arcuate Surfaces In Place For Friction Stir Welding Or Processing	2661618		31 Dec 2012	Canada
System And Method for Holding Materials Having Arcuate Surfaces In Place For Friction Stir Welding Or Processing	201280065849.0		31 Dec 2012	China

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System And Method for Holding Materials Having Arcuate Surfaces in Place For Friction Stir Welding Or Processing	12853559.6		31 Dec 2012	European Patent Office
System And Method for Holding Materials Having Arcuate Surfaces in Place For Friction Stir Welding Or Processing	2014-550539		31 Dec 2012	Japan
System And Method for Holding Materials Having Arcuate Surfaces in Place For Friction Stir Welding Or Processing	10-2014-7021375		31 Dec 2012	South Korea
System And Method for Holding Materials Having Arcuate Surfaces in Place For Friction Stir Welding Or Processing	MX/e/2014/007881		31 Dec 2012	Mexico
System And Method for Holding Materials Having Arcuate Surfaces in Place For Friction Stir Welding Or Processing	13/731489		31 Dec 2012	United States
Method for holding curved surfaces in place for friction stir processing/joining	61/581955		30 Dec 2011	United States
System And Method for Holding Materials Having Arcuate Surfaces in Place For Friction Stir Welding Or Processing	PCT/US2012/072280		31 Dec 2012	WIPO
System And Method for Holding Materials Having Arcuate Surfaces in Place For Friction Stir Welding Or Processing	2014/04903		31 Dec 2012	South Africa
Friction Bit Joining Of Materials Using A Friction Rivet	16701643.7		13 Jan 2016	European Patent Office
Friction Bit Joining Of Materials Using A Friction Rivet	2016563900		13 Jan 2015	Japan
Friction Bit Joining Of Materials Using A Friction Rivet	1020167022017		13 Jan 2016	South Korea
Friction Bit Joining Of Materials Using A Friction Rivet	8764375	10 Sep 2017	13 Jan 2014	United States
Friction Bit Joining Of Materials Using A Friction Rivet	PCT/US2015/011133		13 Jan 2015	WIPO
Friction Bit Joining of Materials	1120140215308		04 Mar 2013	Brazil
Friction Bit Joining of Materials	PCT/US2013/028815		04 Mar 2013	Canada
Friction Bit Joining of Materials	PCT/US2013/028815		04 Mar 2013	China

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Friction Bit Joining of Materials	PCT/US2013/028815		04 Mar 2013	European Patent Office
Friction Bit Joining of Materials	PCT/US2013/028816		04 Mar 2013	Japan
Friction Bit Joining of Materials	1020147024241		04 Mar 2013	South Korea
Friction Bit Joining Of Materials	13/783740		04 Mar 2013	United States
Friction Bit Joining of Materials	81/806218		02 Mar 2012	United States
Friction Bit Joining of Materials	PCT/US2013/028815		04 Mar 2013	WIPO
Disposable Mandrel for Friction Stir Joining	1235/2014		14 May 2013	United Arab Emirates
Disposable Mandrel for Friction Stir Joining	13791585.8		14 May 2013	European Patent Office
Disposable Mandrel for Friction Stir Joining	9081371	23 Jun 2015	14 May 2013	United States
Disposable Mandrel for Friction Stir Joining	61/846872		14 May 2012	United States
Disposable Mandrel for Friction Stir Joining	PCT/US2013/041008		14 May 2013	WIPO
Friction Stir Joining Of Curved Surfaces	1236/2014		14 May 2013	United Arab Emirates
Friction Stir Joining Of Curved Surfaces	13791582.6		14 May 2013	European Patent Office
Friction Stir Joining Of Curved Surfaces	13/894228		14 May 2013	United States
Friction Stir Joining Of Curved Surfaces	61/848880		14 May 2012	United States
Friction Stir Joining Of Curved Surfaces	PCT/US2013/041000		14 May 2013	WIPO
Mechanical Flow Joining Of High Melting Temperature Materials	15741463.3		09 Jul 2015	European Patent Office
Mechanical Flow Joining Of High Melting Temperature Materials	15/324850		09 Jul 2015	United States
Mechanical Flow Joining Of High Melting Temperature Materials	62/023166		10 Jul 2014	United States
Mechanical Flow Joining Of High Melting Temperature Materials	PCT/US2015/038766		09 Jul 2015	WIPO
Friction Stir Extrusion of Nonweldable Materials for Downhole Tools	15745030.6		09 Jul 2015	European Patent Office
Friction Stir Extrusion of Nonweldable Materials for Downhole Tools	15/324866		09 Jul 2015	United States

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Friction Stir Extrusion of Nonweldable Materials for Downhole Tools	62/084432		25 Nov 2014	United States
Friction Stir Extrusion of Nonweldable Materials for Downhole Tools	PCT/US2016/039787		09 Jul 2015	WIPO
Method and Apparatus for Friction Stir Welding on Conventional Machining Equipment	62/404932		08 Oct 2016	United States
Low-cost Friction Stir Processing Tool	62/667043		04 May 2018	United States
Instrumented Tool Handler for Friction Stir Welding	18191104.1		28 Aug 2018	European Patent Office
Instrumented Tool Handler for Friction Stir Welding	2018160498		29 Aug 2018	Japan
Instrumented Tool Handler for Friction Stir Welding	16/115188		28 Aug 2018	United States
Instrumented Tool Handler for Friction Stir Welding	62/552199		30 Aug 2017	United States
Method and Apparatus for Friction Stir Welding on Conventional Machining Equipment	15/719731		29 Sep 2017	United States
Friction Stir Processing Tool with Radial Protrusion				United States
Friction Stir Processing Tool with Radial Protrusion				European Patent Office
Friction Stir Processing Tool with Radial Protrusion	62/589020		21 Nov 2017	United States
Devices, Systems, and Methods for Increased Wear Resistance During Low Temperature Friction Stir Processing	18191115.7		28 Aug 2018	European Patent Office
Devices, Systems, and Methods for Increased Wear Resistance During Low Temperature Friction Stir Processing	2018160482		29 Aug 2018	Japan
Devices, Systems, and Methods for Increased Wear Resistance During Low Temperature Friction Stir Processing	16/115195		28 Aug 2018	United States
Devices, Systems, and Methods for Increased Wear Resistance During Low Temperature Friction Stir Processing	62/552700		31 Aug 2017	United States
Systems and Methods for Friction Bit Joining	62/668946		09 May 2018	United States
Friction Stir Processing Tool With Radial Protrusion	16/189,022		13 Nov 2018	United States
Friction Stir Processing Tool With Radial Protrusion	18205523.6		9 Nov 2018	European Patent Office