



# SLOT MACHINES

Patent **iNSIGHT** Pro  
Transform Patents to Intelligence

Slot machines are mechanical devices which employ three, four or even more reels of several different dimensions and are popularly used as gaming devices in casinos. The video slot machines uses video reels rather than using physical reels. Every reel, whether it is physical or virtual, will have different symbols on it. The symbols could be just about anything: numbers, fruits, bells or any other type of characters. One of the most favorite characters on the slot machine reels is number 7, which can be seen in almost all types of slot machines today.

This report takes a look into the patenting activity around slot machines uncovering the inventors, patents, the companies and the intellectual property history behind these gaming devices.

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## Brief History of Slot Machines

Slot machines date back to the 19th century that has greatly evolved over the years to suit gamblers. Charles Fey first created this casino gambling device in 1895. However, it became a popular casino device only in 1907 when Mills Novelty Company first introduced it into the market in collaboration with Fey. Popularly known as the "Mills Liberty Bell", the slot machine worked mechanically on spinning reels. A century later, the slot machines evolved from a primitive mechanical device to an online video slot.

Today there are traditional as well as online slots games, with a huge number of games in both these versions. The technology of slot machines has also changed a lot over the years. The classic mechanical designs have been almost completely replaced by computer-controlled machines. But the game has remained the same. The player pulls a handle to rotate a series of reels (typically three) that have pictures printed on them.



Modern Electronic Slot Machine

Image Source:

[http://inventors.about.com/od/sstartinventions/a/Slot\\_Machines.htm](http://inventors.about.com/od/sstartinventions/a/Slot_Machines.htm)

## Overview

Patent filings around Slot Machine hold interesting insights into the innovation, research and development within the space. With the help of Patent iNSIGHT Pro, we will analyze the all the patent data around slot machines to find answers to the following:

- What does the IP publication trend for Slot Machine look like and how has activity around filings evolved?
- Who are the top assignees or key players in Slot Machine and what are their technology wise trends?
- How is Assignee Portfolios spread across different Slot machine types?

To get a more accurate and all round perspective on these the patent set has been classified into these two categories.

### By Types

- Bonus Multiplier Slots
- Buy-a-Pay Slots
- Loyalty Slot Machines
- Multipayline Machines
- Progressive Slot Machines
- Straight Slot Machines
  - a) Bonus Slots
  - b) Feature Slots
  - c) Multi Line Slots
  - d) Single Line Slots/Classic Slots
- Video/ Online Slots

### By Parts

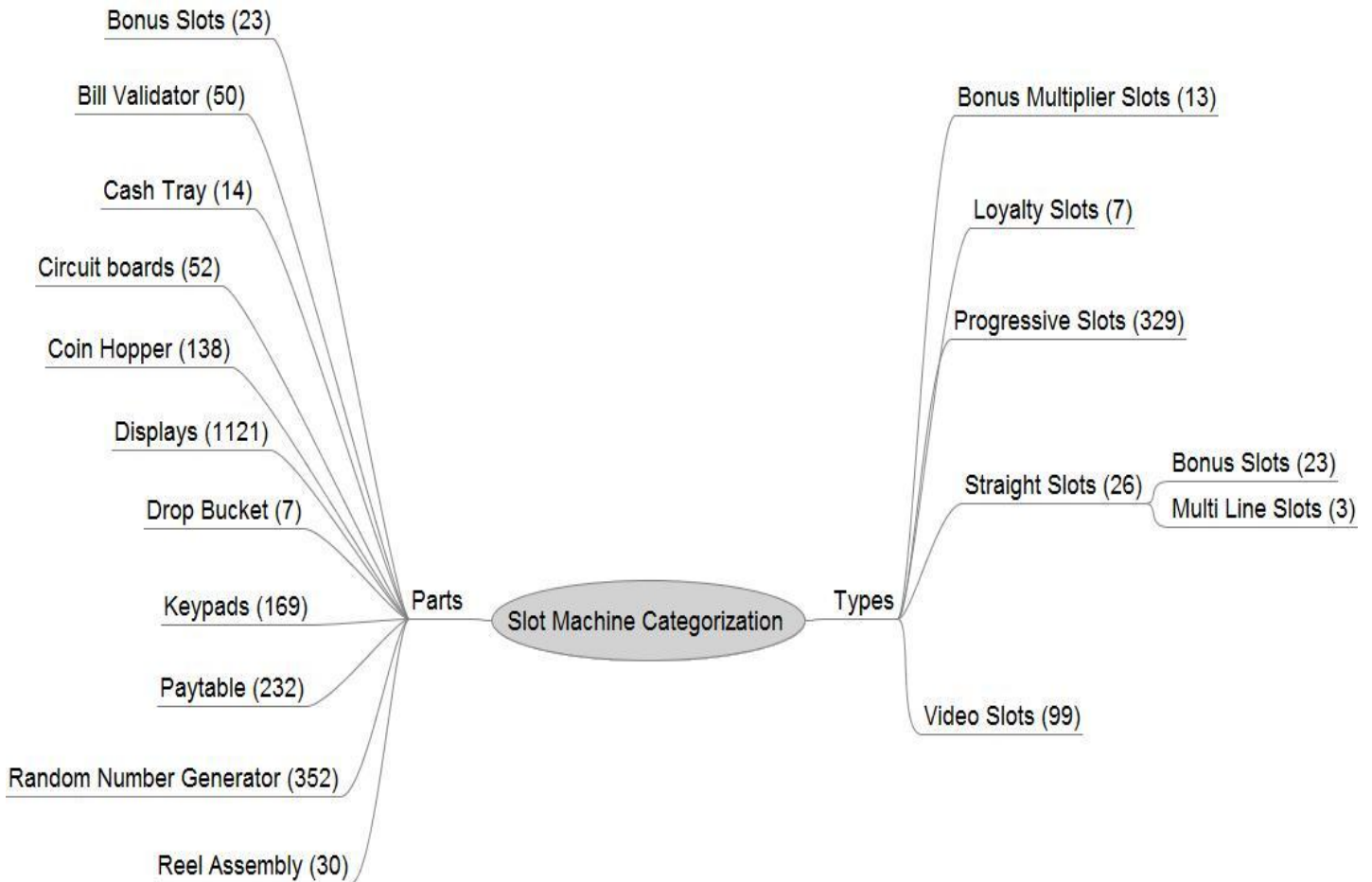
- Bill Validator
- Cash Tray
- Circuit Boards
- Coin Counter
- Coin Hopper
- Displays
- Drop bucket or drop box
- Keypads
- Paytable
- Random Number Generators
- Reel Assembly



Progressive Slot Machine  
screen

Image source:  
[http://www.casinoreviewbank.com/Progressive\\_slots/](http://www.casinoreviewbank.com/Progressive_slots/)

The illustration below shows the different categories prepared and the number of records in each. The categorization involved defining a search strategy for each topic and then conducting the search using the Advanced Searching capability in Patent iNSIGHT Pro. Details of search strings used for each category are given in Appendix B.



## The Search Strategy

The first step is to create and define a patent set that will serve as the basis of our analysis.

Using the commercial patent database PatBase as our data source we used the following search query to create our patent set.

FT – Full Text

IC – International Class

UC – US Class

```
((FT=(casino or gamble or gambling or poker or betting or
wager* or pachinko or pachislo or pachisuro or pokies or
"slot machine" or "gaming machine")) and (IC=(A63F or
G07C or G07D or G07F or G07G))) and (UC=(D21/369 or
D21/370 or D21/371 or D21/375 or 463/16 or 463/17 or
463/18 or 463/19 or 463/20 or 463/21 or 463/22 or
463/25 or 463/26 or 463/27 or 273 or 453)))
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The query was directed to search through the full text and a patent set of 8632 records with one publication per family were generated.

The publications included in the report are updated as of **12<sup>th</sup> May, 2011.**

## Class Descriptions of Classes used in Search Strategy

A63F: CARD, BOARD, OR ROULETTE GAMES; INDOOR GAMES USING SMALL MOVING PLAYING BODIES; GAMES NOT OTHERWISE PROVIDED FOR (data-processing equipment characterised by a specific application for game playing G06F 17/00, G06F 19/00)

G07C: TIME OR ATTENDANCE REGISTERS; REGISTERING OR INDICATING THE WORKING OF MACHINES; GENERATING RANDOM NUMBERS; VOTING OR LOTTERY APPARATUS; ARRANGEMENTS, SYSTEMS, OR APPARATUS FOR CHECKING NOT PROVIDED FOR ELSEWHERE (identification of persons, e.g. finger-printing, foot-printing, A61B 5/117; indicating or recording apparatus for measuring in general, analogous apparatus but in which the input is not a variable to be measured, e.g. a hand operation, G01D; clocks, clock mechanisms G04B, G04C; time-interval measuring G04F; counting mechanisms per se G06M)

G07D: HANDLING OF COINS OR OF PAPER CURRENCY OR SIMILAR VALUABLE PAPERS, e.g. TESTING, SORTING BY DENOMINATIONS, COUNTING, DISPENSING, CHANGING OR DEPOSITING

G07F: COIN-FREED OR LIKE APPARATUS (coin sorting G07D 3/00; coin testing G07D 5/00)

## Class Descriptions Continued...

G07G: CHECKING-DEVICES

D21/369: Chance-determining or gambling article

D21/370 Lever operated or slot machine type

D21/371: Random number or chance generator

D21/375: Roulette

463/16: In a chance application

463/17: Lot match or lot combination (e.g., roulette, lottery, etc.)

463/18: Plural lots (e.g., keno, etc.)

463/19: Plural matches create pattern (e.g., bingo, etc.)

463/20: Lot-to-lot combination (e.g., slot machine, etc.)

463/21: Having means to alter combination probability

463/22: Lot generator (e.g., card distribution, simulated dice, random number generator, etc.)

463/25: Credit/debit monitoring or manipulation (e.g., game entry, betting, prize level, etc.)

463/26: Pool amount (e.g., jackpot, etc.)

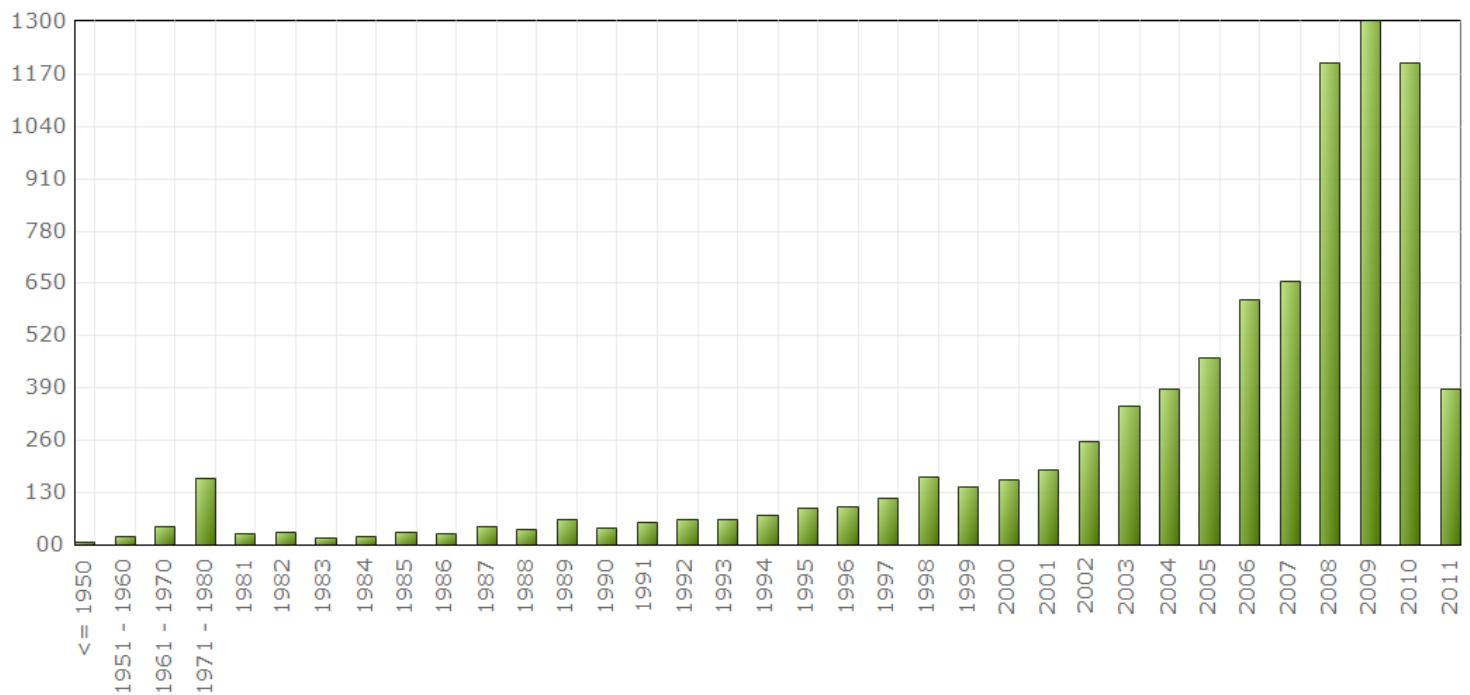
463/27: Pool carryover (e.g., progressive jackpot, etc.)

273: AMUSEMENT DEVICES: GAMES

453: Coin Handling

## Publication Trend

What has been the IP publication trend for Slot Machines?



Patents related to Slot Machines can be traced back to before 1950, although the number of filings remained relatively low all the way up till the year 2000. Noticeably there was a very large spike in publications for 2009 which saw around 1300 patents published during the year.

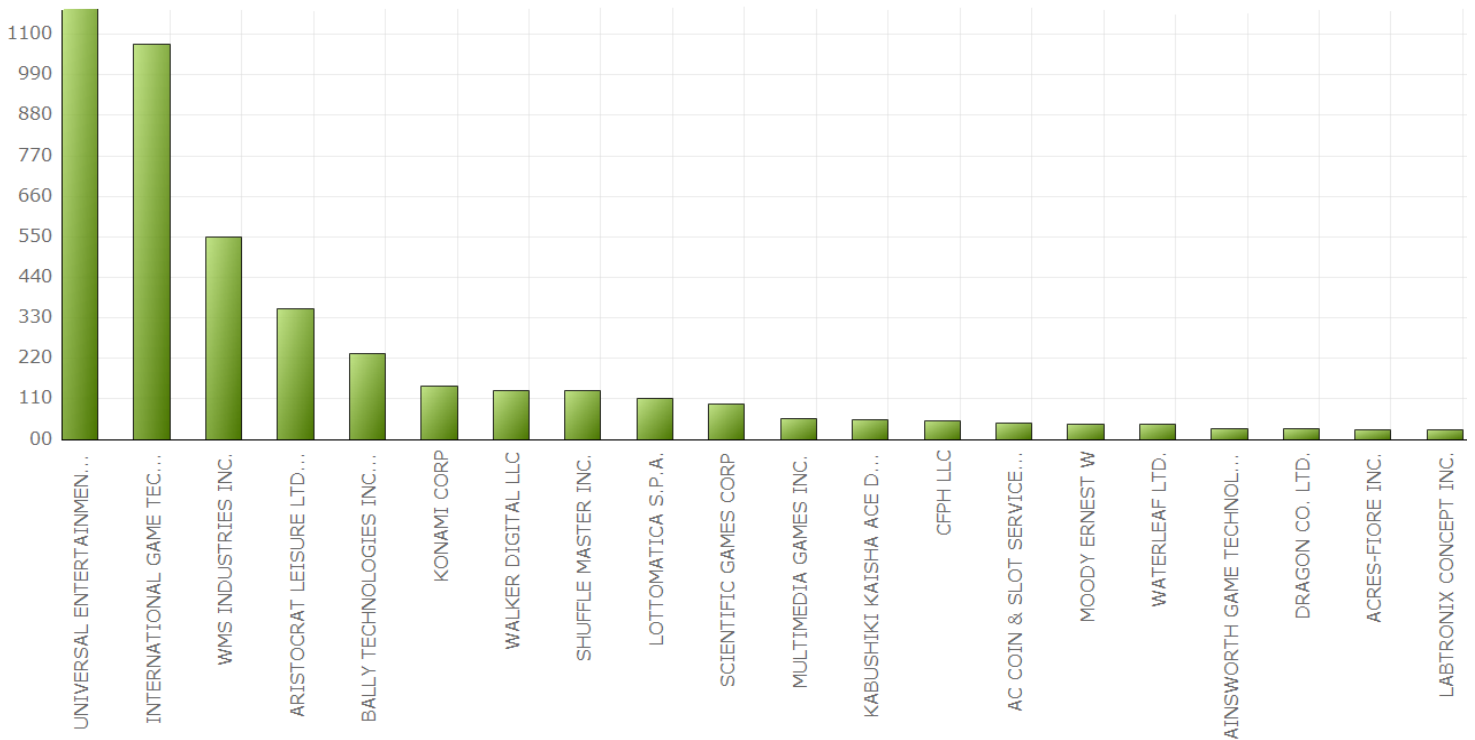
Just a month and a half into 2011 and we are already seeing around 300 patents. It's clear that this technology picked up slowly, grew consistently and is evidently on an upward trend.

### *How we did it?*

Once the patents were populated in Patent iNSIGHT Pro, the publication trend chart was generated on a single click using the dashboard tool.

## Top Assignees

Who have been the top assignees or the key players within this industry?



The top assignees are:

- |                                  |                                     |
|----------------------------------|-------------------------------------|
| 1. UNIVERSAL ENTERTAINMENT CORP  | 11. MULTIMEDIA GAMES INC.           |
| 2. INTERNATIONAL GAME TECHNOLOGY | 13. KABUSHIKI KAISHA ACE DENKEN     |
| 3. WMS INDUSTRIES INC.           | 14. CFPH LLC                        |
| 4. ARISTOCRAT LEISURE LTD.       | 15. AC COIN & SLOT SERVICES CO INC. |
| 5. BALLY TECHNOLOGIES INC.       | 16. MOODY ERNEST W                  |
| 6. KONAMI CORP                   | 17. AINSWORTH GAME TECHNOLOGY LTD.  |
| 7. WALKER DIGITAL LLC            | 18. DRAGON CO. LTD.                 |
| 8. SHUFFLE MASTER INC.           | 19. ACRES-FIORE INC.                |
| 9. LOTTOMATICA S.P.A.            | 20. LABTRONIX CONCEPT INC.          |
| 10. SCIENTIFIC GAMES CORP        |                                     |

### How we did it?

Once the patents were populated in Patent iNSIGHT Pro, the assignee clean-up tools were used to normalize the names. Different cleanup tools were leveraged:

- To locate assignees for unassigned records
- To clean up records having multiple assignees
- To locate the correct assignee names for US records using the US assignments database
- To merge assignees that resulted from a merger or acquisition or name change.

**Please refer Appendix A for more details on Assignee merging.**

Once the Assignee names were cleaned up, the dashboard tool within Patent iNSIGHT Pro was used to find the top 20 assignees within the given patent set. A visual graph was created based on the results of the top assignees with the number of patents alongside each one.

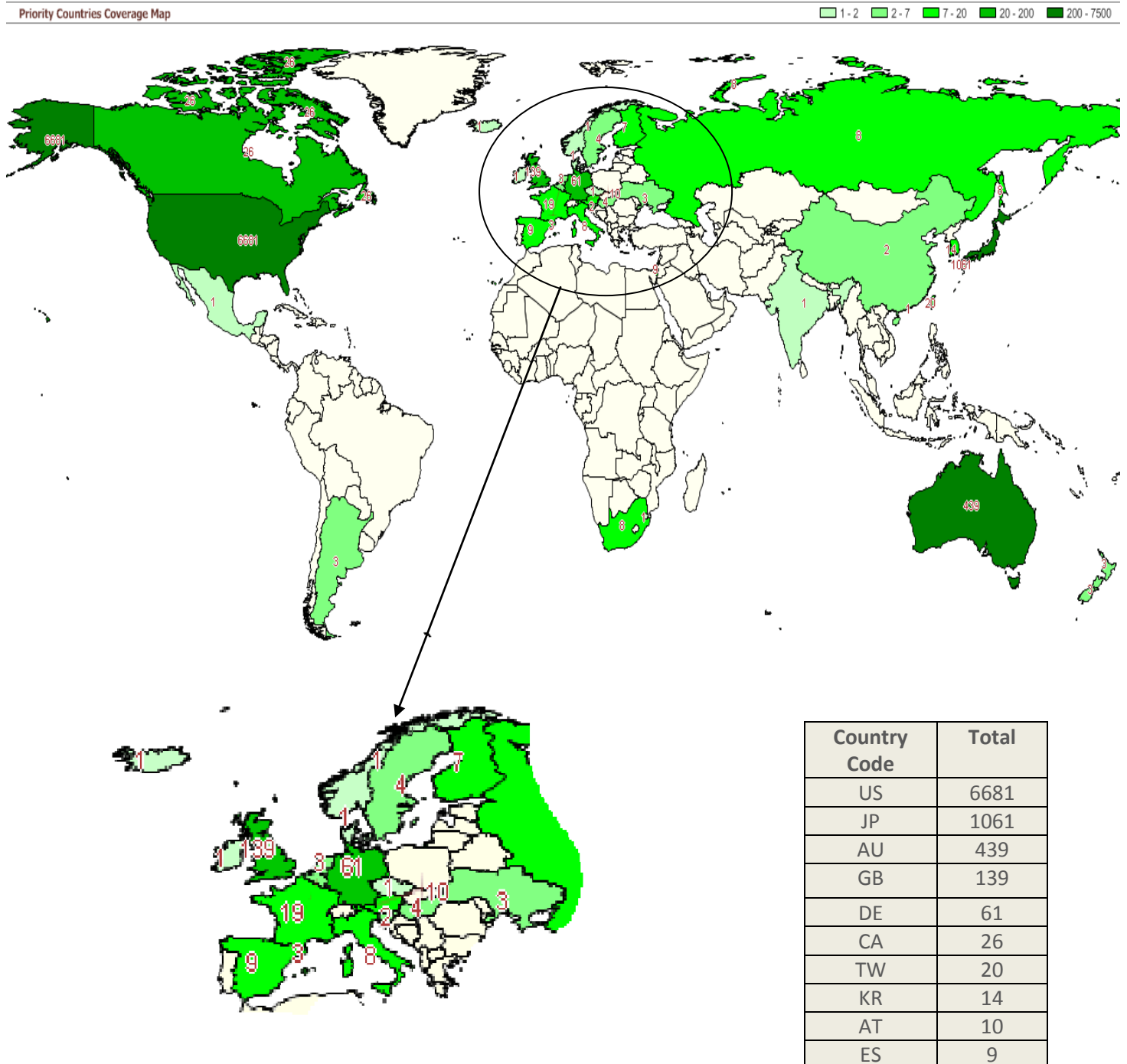
The complete Assignee table is available in the following Excel file:

<http://www.patentinsightpro.com/techreports/0511/List%20of%20Assignees.xls>

## Top Countries

How is research in slot machines spread across different countries?

In terms of regional pockets where patent protection is being sought most frequently for these technologies, the US is in the lead, followed by JP and AU. The map below breaks down slot machine patenting activity priority country wise from 1950. The table below ranks the top 10 priority countries and therefore provides an indication of where the innovation in this technology area is originating:



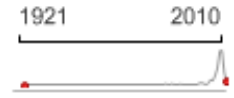




### How we did it?

The map was generated using the Priority country coverage map option provided in the dashboard tool within Patent iNSIGHT Pro.





## Assignee - Key Statistics

Here we summarize key parameters of Top 15 Assignees such as filing trend, Avg. number of Forward citations per record, Top inventors in each Assignee, Top Co-Assignees and Coverage of underlying patent families

Assignee	Total No. of Records	Average No. of Fwd Cites per Patents	Filing Trend ( Absolute )	Filing Year Range	Key Inventor (Top 5)	Co-Assignees	Coverage (Includes families)				
							US	EP	WO	AU	GB
UNIVERSAL ENTERTAINMENT CORP	1181 (13.7%)	1.78		1982-2010	OKADA KAZUO(324) YOSHIZAWA KAZUMASA(210) INAMURA YUKINORI(100) FUJIMOTO JUN(55) KATO YOICHI(41)	SETA CORP(3)	1061	212	21	751	14
INTERNATIONAL GAME TECHNOLOGY	1075 (12.5%)	3.91		1975-2010	BAERLOCHER ANTHONY J(161) WALKER JAY S(130) JORASCH JAMES A(121) GELMAN GEOFFREY M(59) KAMINKOW JOSEPH E(56)	HIGH 5 GAMES(1) RAW THRILLS INC.(1)	478	63	127	183	57
WMS INDUSTRIES INC.	550 (6.4%)	3.01		1991-2010	THOMAS ALFRED(94) JAFFE JOEL R(88) ENGLMAN ALLONG(81) HORNIK JEREMY M(73) PACEY LARRY J(64)	No Co-Assignee Present	459	33	246	126	42
ARISTOCRAT LEISURE LTD.	354 (4.1%)	5.7		1994-2010	BENNETT NICHOLAS LUKE(49) WEISS STEVEN A(20) BRYANT NATALIE(18) FONG COLIN(17) MUIR ROBERT LINLEY(16)	No Co-Assignee Present	300	28	39	403	2
BALLY TECHNOLOGIES INC.	234 (2.7%)	11.17		1976-2010	KELLY BRYAN(31) LUCIANO JR ROBERT A(26) SOLTYS RICHARD(24) HUIZINGA RICHARD(16) NELSON LORENT(16)	No Co-Assignee Present	195	18	32	49	14

KONAMI CORP	146 (1.7%)	4.64		1995-2010	AIDA EIJI(19) KUSUDA KAZUHIRO(11) OKUAKI MASATO(11) UCHIYAMA TAKASHI(10) GOTO NOBUHIRO(10)	Trans No Co-Assignee Present	104	21	25	79	14
WALKER DIGITAL LLC	134 (1.6%)	3.63		1998-2010	WALKER JAY S(130) JORASCH JAMES A(118) TULLEY STEPHEN C(53) GELMAN GEOFFREY M(45) TEDESCO DANIEL E(42)	No Co-Assignee Present	93	0	8	3	0
SHUFFLE MASTER INC.	133 (1.5%)	10.32		1987-2010	SNOW ROGER M(34) YOSELOFF MARK L(21) GRAUZER ATTILA(19) BREEDING JOHN G(17) STASSON JAMES B(16)	KEKEMP ANOS LARRY E.(1)	78	7	25	36	0
LOTTOMATIC A S.P.A.	112 (1.3%)	9.88		1988-2010	GAUSELMANN MICHAEL(42) FINOCCHIO RICHARD(10) ORAM THOMAS K(8) GRAY ANDREW P(4) ROBERTS BRIAN J(4)	No Co-Assignee Present	79	22	27	37	2
SCIENTIFIC GAMES CORP	98 (1.1%)	1.62		1995-2010	HERRMANN MARK E(35) KANE STEVEN N(32) HARDY DOW(27) SABET BIJAN(21) YANOWITZ JASON(19)	No Co-Assignee Present	53	12	25	18	0
MULTIMEDIA GAMES INC.	58 (0.7%)	14.29		1991-2010	LIND CLIFTON(27) LIND JEFFERSON C(25) ENZMINGER JOSEPH R(11) WATKINS BRIAN A(8) WILLYARD RODNEY L(4)	No Co-Assignee Present	36	7	24	16	0
KABUSHIKI KAISHA ACE DENKEN	54 (0.6%)	11.31		1992-2002	TAKEMOTO TAKATOSHI(52) KAWASHIMA KAZUNARI(27) HANDA SHIGERU(8) TSURUMI MASAYUKI(5) CHIDA TOSHIKAZU(4)	No Co-Assignee Present	55	36	44	74	0

CFPH LLC	51 (0.6%)	1.37		1990-2010	ALDERUCCI DEAN P(26) LUTNICK HOWARD W(16) GELMAN GEOFFREY M(16) MILLER MARK A(16) AMAITIS LEE M(9)	Trans No Co-Assignee Present	43	5	17	11	0
AC COIN & SLOT SERVICES CO INC.	47 (0.5%)	6.72		1998-2010	SEELIG JERALD C(47) HENSHAW LAWRENCE M(44) SEELIG MAC R(3) CRAMER DOUGLAS(2) HILTEBRAND MICHAEL(2)	No Co-Assignee Present	36	0	10	3	0







**How we did it?**

In order to compress all the information into a single report, we used the 360 ° series of reports available in the software.

From the Assignee 360° report options, we selected Top 15 Assignees and the different pieces of information we wanted to include in the singular display and then ran the report. The generated report was then exported to Excel using the option provided for the same.

## Inventor - Key Statistics

Here we summarize key parameters of Top 15 Inventors such as filing trend, average number of forward citations per record, key associated companies and top 5 co-inventors.

Inventor	Total No. of Records	Average No. of Fwd Cites per Patents	Filing Trend ( Absolute )	Filing Year Range	Key Assignees (Top 5)	Co-Inventors
OKADA KAZUO	325 (3.8%)	3.07		1982-2010	UNIVERSAL ENTERTAINMENT CORP(324) FUJITSU LTD.(1) SETA CORP(1)	FUJIMOTO JUN(7) KOBAYASHI MASATSUGU(4) OGAWA TOSHIYA(4) TAKEDA MAYUMI(4) INAMURA YUKINORI(3)
WALKER JAY S	261 (3%)	2.9		1984-2010	INTERNATIONAL GAME TECHNOLOGY(130) WALKER DIGITAL LLC(130) JORASCH JAMES A(73) TULLEY STEPHEN C(32) GELMAN GEOFFREY M(32)	JORASCH JAMES A(234) GELMAN GEOFFREY M(104) TULLEY STEPHEN C(94) TEDESCO DANIEL E(76) TEDESCO ROBERT C(75)
JORASCH JAMES A	240 (2.8%)	3.34		1994-2010	INTERNATIONAL GAME TECHNOLOGY(121) WALKER DIGITAL LLC(118) JORASCH JAMES A(73) TULLEY STEPHEN C(31) GELMAN GEOFFREY M(31)	WALKER JAY S(234) GELMAN GEOFFREY M(102) TULLEY STEPHEN C(85) TEDESCO DANIEL E(70) TEDESCO ROBERT C(69)
YOSHIZAWA KAZUMASA	211 (2.4%)	0.08		2005-2010	UNIVERSAL ENTERTAINMENT CORP(210) YOSHIZAWA KAZUMASA(1)	INAMURA YUKINORI(12) FUJIMOTO JUN(11) KATO YOICHI(5) OGINO SHINJI(4) SAITO HIROKI(3)
BAERLOCHER ANTHONY J	161 (1.9%)	3.1		1997-2010	INTERNATIONAL GAME TECHNOLOGY(161)	WEBB BAYARD S(23) KAMINKOW JOSEPH E(22) DEWAAL DANIEL J(14) PETERSON LANCE R(11) BLOMQUIST CARL L(9)
GELMAN GEOFFREY M	121 (1.4%)	2.03		2000-2010	INTERNATIONAL GAME TECHNOLOGY(59) WALKER DIGITAL LLC(45) GELMAN GEOFFREY M(33) JORASCH JAMES A(31) TULLEY STEPHEN C(18)	WALKER JAY S(104) JORASCH JAMES A(102) TULLEY STEPHEN C(54) TEDESCO DANIEL E(44) SANTISI STEVEN M(36)

INAMURA YUKINORI	101 (1.2%)	0.54		1998-2010	UNIVERSAL ENTERTAINMENT CORP(100) AZUZE CORP(1)	FUJIMOTO JUN(26) YOSHIZAWA KAZUMASA(12) KATO YOICHI(4) OKADA KAZUO(3) DANJO HIROYUKI(2)
THOMAS ALFRED	100 (1.2%)	5.78		1994-2010	WMS INDUSTRIES INC.(94) CASE VENTURE MANAGEMENT LLC(3) THOMAS ALFRED(2) BROWN DUNCAN F(1) DEMAR LAWRENCE E(1)	GOMEZ BENJAMIN T(17) GAGNER MARK B(16) JAFFE JOEL R(15) AOKI DION K(13) PACEY LARRY J(13)
TULLEY STEPHEN C	98 (1.1%)	2.69		1998-2010	WALKER DIGITAL LLC(53) INTERNATIONAL GAME TECHNOLOGY(45) TULLEY STEPHEN C(32) JORASCH JAMES A(31) TEDESCO DANIEL E(21)	WALKER JAY S(94) JORASCH JAMES A(85) TEDESCO DANIEL E(55) GELMAN GEOFFREY M(54) SANTISI STEVEN M(23)
JAFFE JOEL R	92 (1.1%)	5.21		1999-2010	WMS INDUSTRIES INC.(88) JAFFE JOEL R(3) HORNIK JEREMY M(3) ANSARI MARWAN(2) SYLLA CRAIG J(1)	ENGLMAN ALLON G(29) HORNIK JEREMY M(24) PACEY LARRY J(16) THOMAS ALFRED(15) AOKI DION K(13)
ENGLMAN ALLON G	85 (1%)	0.65		2002-2010	WMS INDUSTRIES INC.(81) ENGLMAN ALLON G(4) HORNIK JEREMY M(2) GOMEZ BENJAMIN T(1) HORMIK JEREMY M(1)	HORNIK JEREMY M(35) JAFFE JOEL R(29) MASTROPIETRO MICHAEL W(20) PACEY LARRY J(15) ANDERSON PETER(8)
HORNIK JEREMY M	81 (0.9%)	0.57		2003-2010	WMS INDUSTRIES INC.(73) HORNIK JEREMY M(7) JAFFE JOEL R(3) ENGLMAN ALLON G(3) ANSARI MARWAN(2)	ENGLMAN ALLON G(35) JAFFE JOEL R(24) PACEY LARRY J(17) AOKI DION K(12) MASTROPIETRO MICHAEL W(11)
TEDESCO DANIEL E	79 (0.9%)	2.08		2000-2010	WALKER DIGITAL LLC(42) INTERNATIONAL GAME TECHNOLOGY(37) JORASCH JAMES A(30) TEDESCO DANIEL E(30) TULLEY STEPHEN C(21)	WALKER JAY S(76) JORASCH JAMES A(70) TULLEY STEPHEN C(55) GELMAN GEOFFREY M(44) TEDESCO ROBERT C(32)
TEDESCO ROBERT C	78 (0.9%)	1.1		2004-2010	INTERNATIONAL GAME TECHNOLOGY(44) WALKER DIGITAL LLC(34) TEDESCO ROBERT C(21) JORASCH JAMES A(19) TEDESCO DANIEL E(10)	WALKER JAY S(75) JORASCH JAMES A(69) TEDESCO DANIEL E(32) FINCHAM MAGDALENA M(19) TULLEY STEPHEN C(16)
PACEY LARRY J	69 (0.8%)	1.28		2001-2010	WMS INDUSTRIES INC.(64) PACEY LARRY J(5) HORNIK JEREMY M(2) JOSHI SHRIDHAR P(1) RASMUSSEN JAMES M(1)	HORNIK JEREMY M(17) JAFFE JOEL R(16) JOSHI SHRIDHAR P(16) ENGLMAN ALLON G(15) GAGNER MARK B(13)

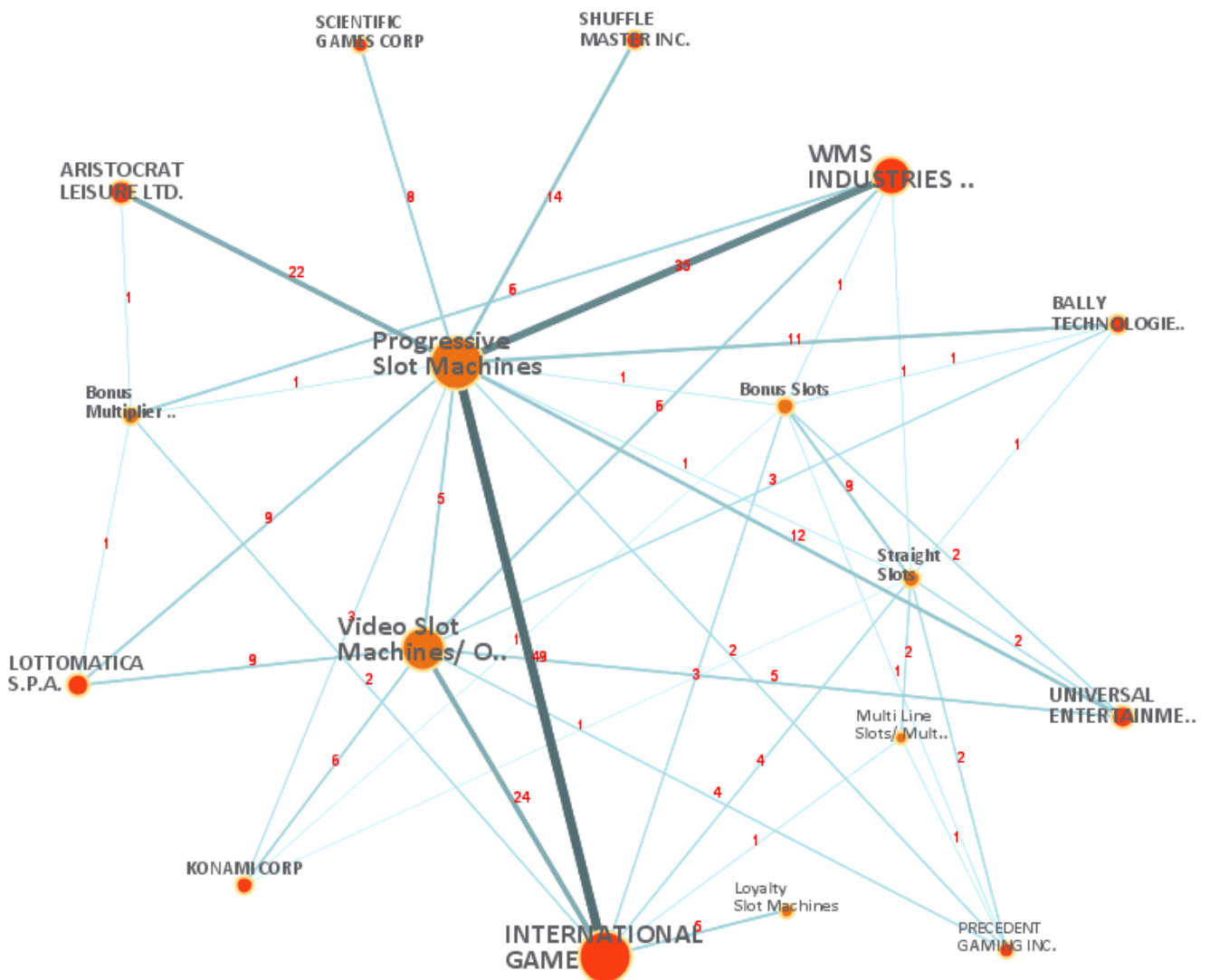
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**Assignee Portfolios spread across different Slot machine types**

Here we have correlated key slot machine types along with a listing of the key assignees in each category. In the map, each assignee is connected through links whose thickness and color intensity is directly proportional to the number of records relating them. The number (in red) next to each line represents the number of records held by the Assignee in the particular type of slot machine.

International Game Technology and WMS Industries lead the assignees for patents in Progressive Slots and Video Slots.

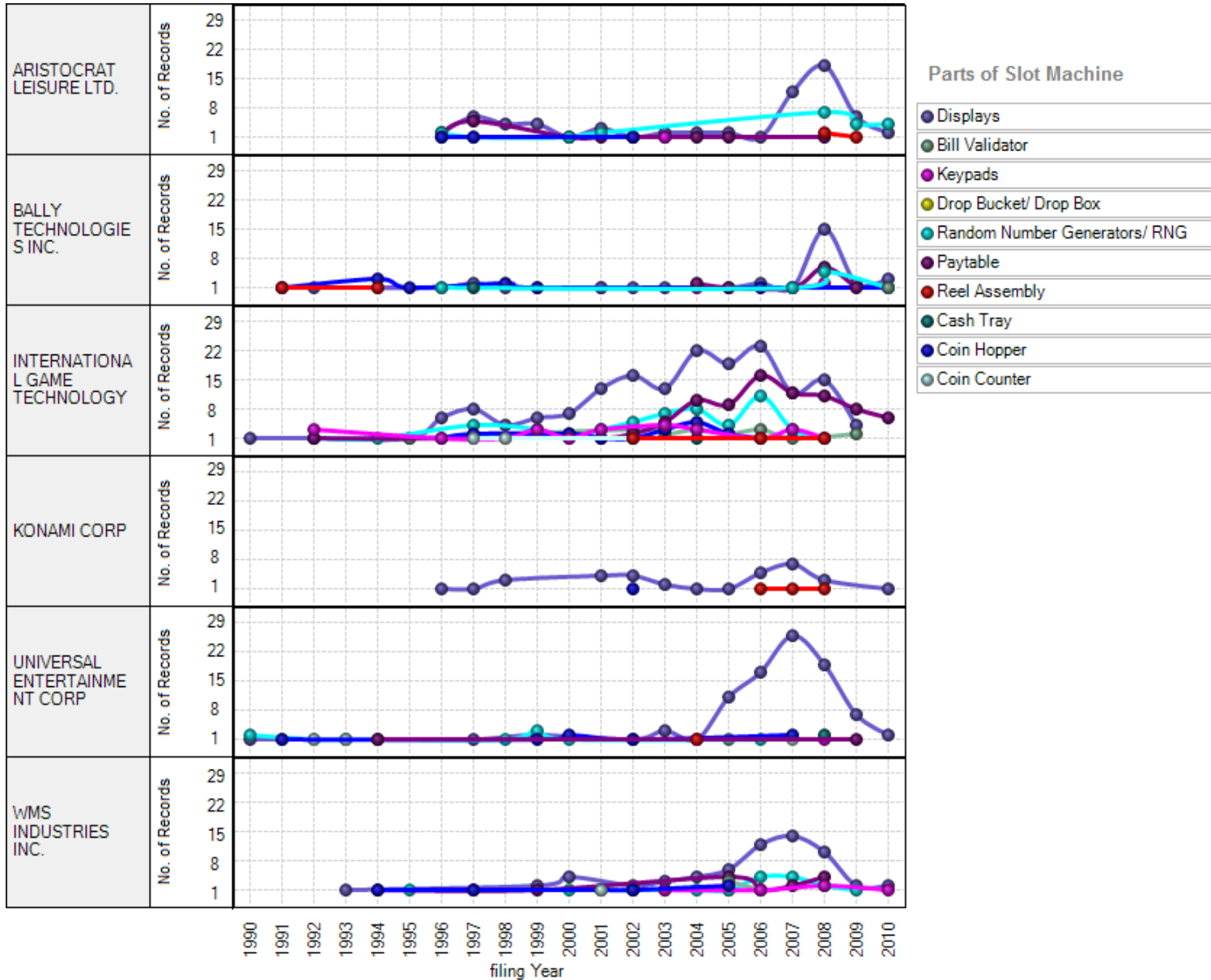


**How we did it?**

First the various types of slot machines were identified by online research. Then by using a combination of semantic analysis tools such as the clustering tools and searching tools available in Patent iNSIGHT Pro, patents were categorized under the different types. A co-occurrence matrix was generated to map the types of slot machines with assignees. The matrix was filtered for the top 10 Assignees and finally the matrix was converted into the above Correlation map using an option provided in software for the same.

Detailed analysis of key slot machine parts for top five assignees

Number of records refers to the absolute number of filings per part per Assignee.



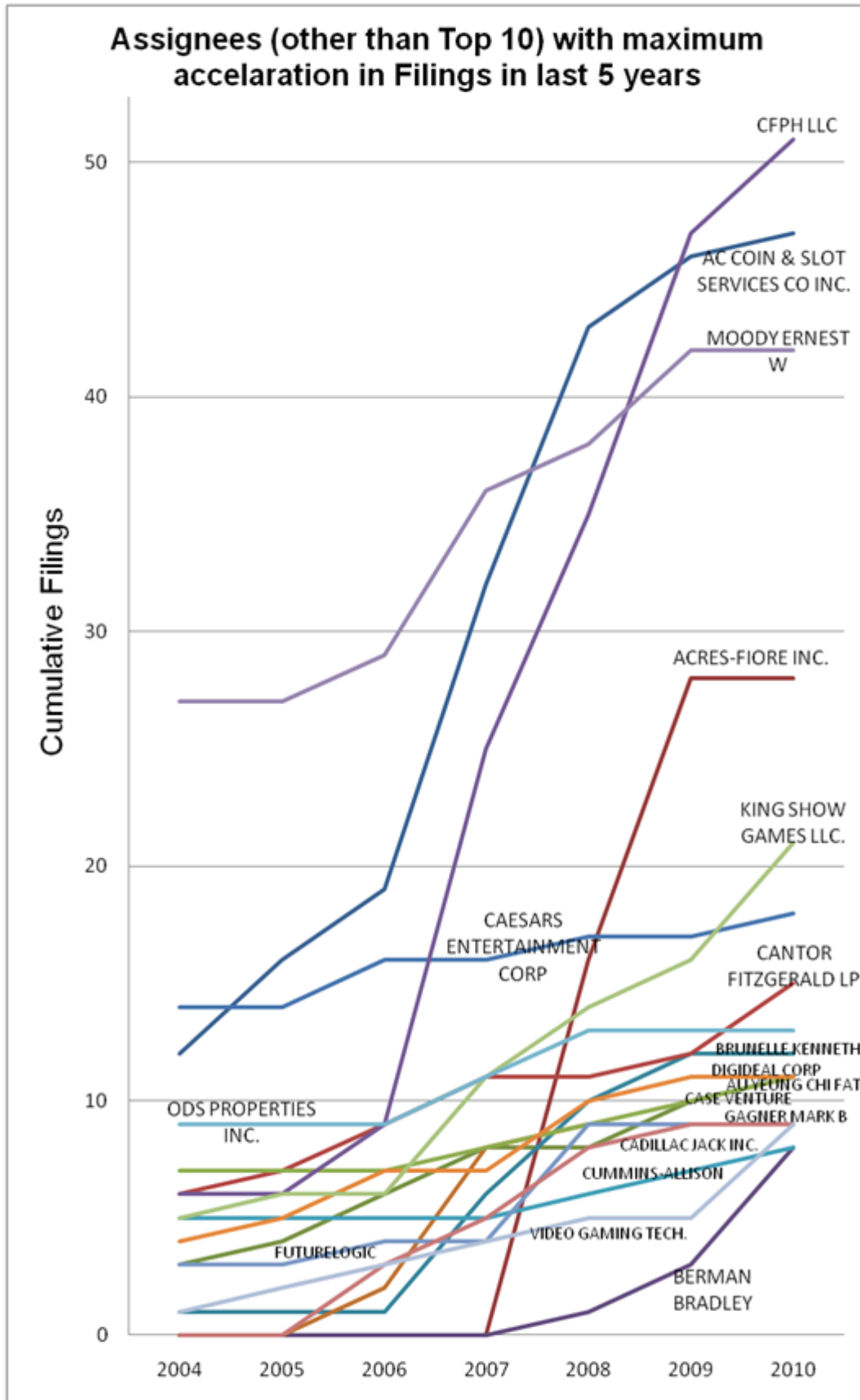
By analyzing the patent filing trends from 1990 to 2010 it's evident RNG technology filings dominate the publication trends by a wide margin with rest technologies still seeing some activity and Coin Hopper technology dwindling far behind.

*Note: A RNG or random number generator is a computational or physical device designed to generate a sequence of numbers or symbols that lack any pattern, i.e. appear random.*

**How we did it?**

We used the categories created and using the co-occurrence analyzer, we generated a 4-D matrix containing Assignee, Slot machine part, Filing Years and Number of Records. We then filtered top five assignees and also restricted the results to patents filed from 1990 to 2010. This resulting matrix was then converted into a chart.

Which assignees (other than top 10) have shown maximum acceleration in filings in last five years?





The graph shows a steady increase in the filing activity for Cadillac Jack Inc. and inventor Gagner Mark B both of whom had zero records in 2004.

***How we did it?***

Using the Assignee Trend option in the dashboard we generated a table of cumulative filings for Top 50 filtered assignees. We removed top 10 firms and then calculated the growth rate (acceleration) across cumulative filings for the rest of the firms over last five years data i.e., 2005-2010.

The results were exported to excel using the show table feature provided. The records gathered for each time span were then displayed using a line chart in Excel.

## Appendix A: Key Assignee Normalization Table

Note: The tables below include normalization from US Assignments database and so some assignees may appear under multiple normalized names.

### INTERNATIONAL GAME TECHNOLOGY

INT GAME TECH  
CYBERSCAN TECH INC  
ACRES GAMING INC  
IGT RENO NEV  
ARL INC  
IGT A NEVADA CORP  
PRECEDENT GAMING INC  
CYBERVIEW TECHNOLOGY INC  
IGT UK LTD  
MUDALLA TECHNOLOGY INC  
IGT  
BARCREST LTD  
INT GAME TECHNOLOGY IGT  
INFINATIONAL TECH INC  
EAGLE CO LTD  
ANCHOR COIN INC  
DD STUD INC  
VIDEO LOTTERY TECH INC  
CHIP TRACK INTERNATIONAL  
SILICON GAMING INC  
VIDEO LOTTERY TECHNOLOGIES  
SHUFFLE MASTER INC  
FOREVER ENDEAVOR SOFTWARE INC  
ANCHOR GAMING  
WALKER ASSET MANAGEMENT LTD  
SILICON GAMING NEVADA  
INTERNAT GAME TECHNOLOGIES  
I G T AUSTRALIA PTY LTD  
RADICAL GAMING CONCEPTS LTD  
COLEPAT LLC  
NEURIZON PTY LTD  
PROGRESSIVE GAMING INTERNAT CO  
WESTERN MONEY SYSTEMS

### ARISTOCRAT LEISURE LTD.

ARISTOCRAT TECHNOLOGIES AU  
ARISTOCRAT TECHNOLGIES INC  
ARISTOCRAT TECHNOLOGIES INC  
ARISTOCRAT TECHONOLOGIES AUSTR  
CASINO DATA SYS  
ARISTOCRAT LEISURE IND PTY LTD  
ARISTOCRAT EUROP LIMITED  
ARISTOCAT LEISURE INDUSTIRES P  
CASINO DATA SYSTEMS INC  
CASINO DATA SYSTEM

**WMS INDUSTRIES INC.**

WMS GAMING INC  
WMS GAMING  
SYSTEMS IN PROGRESS HOLDING GM  
PRECEDENT GAMING INC  
WMS GARMING INC  
WMS GAING INC  
WMMS GAMING INC  
WMS GAMNG INC  
WILLIAM ELECTRONICS GAMES INC  
WILLIAMS ELECTRONIC GAMES INC  
WILLIAMS ELECTRONICS GAMES INC  
ORION CASINO TECHNOLOGY B V  
VMS GAMING INC

**UNIVERSAL ENTERTAINMENT CORP**

ARUZE CORP  
ARUZE CO LTD  
ARUZE GAMING AMERICA INC  
SETA CORP  
FUJITSU LTD  
UNIVERSAL ENTERTAINMENT  
UNIVERSAL ENTERTAINMENT CORP  
UNIVERSAL ENTERTAINMENT CORP  
UNIVERSAL KK  
SIGMA ENTERPRISES INC  
SIGMA INC  
UNIVERSAL COMPANY LTD  
UNIVERSAL SALES CO LTD  
UNIVERSAL DISTRIBUTING OF NEVA

**WALKER DIGITAL LLC**

WALKER JAY S  
JORASCH JAMES A  
WAKKER JAY S  
SCHNEIER BRUCE  
BALLY GAMING INC  
WALKER DIGITAL LLC

**Appendix B: Search Strings Used for Categorization**

**Categorization: Types of Slot Machines**

1. Bonus Multiplier Slots

Bonus Multiplier Slots	
(TAC) contains ("bonus multiplier")	13 results

2. Loyalty Slots

Loyalty Slots	
(TAC) contains ("loyalty card")	7 results

3. Progressive Slots

Progressive Slots	
(TAC)contains ("progressive slot" or "slant top")	8 results
(TAC)contains (progressive w/3 (slot* or jackpot*))	323 results

4. Straight Slots

a) Bonus Slots

Bonus Slots	
(TAC) contains (bonus w/3 slot*)	23 results

b) Multi Line Slots

Multi Line Slots	
(TAC) contains ("multi line" or multiline or "multiple payline" or multiplepayline) w/3 slot*	3 results

5. Video Slots

Video Slots	
(TAC) contains ("video slot" or "online slot")	99 results

## Categorization: Parts

### 1. Bill Validator

Bill Validator	
(TAC) contains (bill w/3 validat*)	50 results

### 2. Cash Tray

Cash Tray	
(TAC) contains (cash w/3 (box or bin or tray))	14 results

### 3. Circuit Boards

Circuit Boards	
(TAC)contains (circuit w/3 board*)	52 results

### 4. Coin Counter

Coin Counter	
(TAC) contains ((coin or token) w/3 count*)	42 results

### 5. Coin Hopper

Coin Hopper	
(TAC) contains ((coin or token) w/3 hopper*) or hopper*	138 results

### 6. Displays

Displays	
(TAC) contains (monitor or screen)	1121 results

### 7. Drop bucket or drop box

Drop bucket or drop box	
(TAC) contains (drop w/3 (box or bucket or bin or tray))	7 results

### 8. Keypads

Keypads	
(TAC) contains (keypad* or keyboard*)	169 results

### 9. Paytable

Paytable	
(TAC) contains payable*	232 results

## 10. Random Number Generators

Random Number Generators	
(TAC) contains (random or pseudorandom) w/3 ("number generator" or "number generators") or (RNG or PRNG)	352 results

## 11. Reel Assembly

Reel Assembly	
( TAC ) contains (reel w/3 assemb*)	30 results

## Summary

Patent analysis shows research around slot machines can be traced back to as early as the 1950's but the last decade has certainly been the era when this space has taken off to levels far above any of the previous decades. Companies such as Universal Entertainment Corp, International Game Technology and WMS Industries Inc. are amongst the leaders with the largest patent portfolios.

Overall, the research and development work related to finding solutions to slot machines appears to be a highly active and growing one that can only be expected to increase in the near future.

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