

A Review on Various Generations of Artificial Turf Pitches

歷代人造草運動場回顧

Presented by:

Mr. Francis Li 李承晉先生

Parks Supplies Company Limited

栢溢名基康體設備有限公司




栢溢名基康體設備
Parks Supplies Co., Ltd.

**4th Seminar on Practical Turf Management
Natural and Artificial Turf Pitches - Your Choice**



Greenfields
artificial grass



The good old days
美好的集體回憶





栢溢名基康體設備
Parks Supplies Co., Ltd.

**4th Seminar on Practical Turf Management
Natural and Artificial Turf Pitches - Your Choice**



Greenfields
ARTIFICIAL TURF



栢溢名基康體設備
Parks Supplies Co., Ltd.

4th Seminar on Practical Turf Management
Natural and Artificial Turf Pitches - Your Choice



Artificial Turf 人造草

- A surface of synthetic fibres made to look [and feel] like natural grass
合成纖維製成仿真草面，外觀和感覺與天然草相似
- Most often used in arenas [and stadia] for sports that were originally or are normally played on grass
常用於需在草地上進行之運動
- Also used on residential lawns and commercial applications
亦用於居家草地和商業用途上
- Main reason is maintenance—artificial turf stands up to heavy use, such as in sports, and requires no irrigation or trimming.
主因與維護有關: 人造草可承受大使用量，且不需灌溉和修剪

[Adapted from: http://en.wikipedia.org/wiki/Artificial_turf]



Artificial Turf (人造草)

Sports turf

運動用人造草

vs

對

Landscape turf

園藝用人造草



栢溢名基康體設備
Parks Supplies Co., Ltd.

4th Seminar on Practical Turf Management
Natural and Artificial Turf Pitches - Your Choice



Greenfields
ARTIFICIAL TURF SPECIALISTS

History of Artificial Turf [for Sports]

【運動用】人造草歷史

- Artificial turf has been around for several decades
人造草已有幾十年歷史
- Has been used in different sports – with varying degrees of success and intensity
用於各類運動上 – 不同程度的成功
- Since the first-generation turf of 1960
第一代人造草由1960年已出現
- 1G Turf ?
「一代草」？



[Adapted from FIFA website <http://quality.fifa.com/en/Football-Turf/About-Football-Turf/What-is-Football-Turf>]





History of Artificial Turf [for Sports]

【運動用】人造草歷史

Spacesuit uniforms for the groundkeepers as they prepare the diamond for the first game in the Astrodome, Houston, Texas, April 12, 1965. The dome, as seen here, had a translucent roof to allow the grass to grow but glare caused the panes to be painted over, which caused the grass to die, until eventually Monsanto invented AstroTurf as a replacement. Photograph: Robert Riger/Getty Images





栢溢名基康體設備
Parks Supplies Co., Ltd.

**4th Seminar on Practical Turf Management
Natural and Artificial Turf Pitches - Your Choice**



Greenfields 10
artificial grass

History of Artificial Turf [for Sports]

【運動用】人造草歷史

The first major installation of artificial turf at the Houston Astrodome indoor stadium when it was determined that natural turf could not survive under the low light intensities within a covered stadium.



2G Turf 「二代草」



2G Turf 「二代草」



[Quoted
<http://qu>



Parks Supplies Co., Ltd.

Natural and Artificial Turf Pitches - Your Choice

www.parkssupplies.com

2G Turf 「二代草」

- More and more football pitches in Hong Kong installed with 2G Turf in 1990's replacing hard surface

愈來愈多足球場開始採用「二代草」替代硬地面



Tsang Tai Uk football pitch
曾大屋足球場



Characteristics of 2G Turf

「二代草」的特徵

- Unfilled or sand-filled
無填充物或以沙作填充物
- Yarn fibre mostly of PE / PP
草絲多為聚乙烯/聚丙烯
- Short pile height
草絲較短
- Not particularly “skin-friendly”
不大“皮膚友善”
- Padded or non-padded
有底墊或無底墊
- For hockey and multi-sports
用作曲棍球和其他運動
- Others
其他



2G Turf 「二代草」



Is there a better solution?
對足球和橄欖球運動有沒有更好的解決辦法?

Is there a better solution?
對足球和橄欖球運動有沒有更好的解決辦法?



栢溢名基康體設備
Parks Supplies Co., Ltd.

4th Seminar on Practical Turf Management
Natural and Artificial Turf Pitches - Your Choice



Greenfields 16



3G Turf 「三代草」



3G Turf 「三代草」

- “..... The suitability of unfilled or sand-filled artificial turf systems for football has always been a matter of much debate
“..... 無填充物或以沙作填充物之人造草系統在足球運動上的適用性一直引起廣泛爭論”
- and it is therefore only with the introduction of the third-generation systems (3G) that include both sand and rubber infill
..... 直至引入沙和膠粒做填充物的「三代草」系統
- that the surfaces have become a true alternative.”
..... 人造草才成為真正的替代品。”

[Quoted from FIFA website <http://quality.fifa.com/en/Football-Turf/About-Football-Turf/What-is-Football-Turf/>]



3G Turf 「三代草」

The history of artificial sports turf in football

- **1966**
- **The first artificial playing surface**
- The first artificial playing surface in sport is installed and used in the Astrodome in Houston, Texas. The surface becomes known as Astro Turf.
- **1980**
- **Artificial turf in football**
- Artificial turf is used for the first time in professional football in the 1980s. Clubs in England, like Queens Park Rangers, replace their natural grass surfaces with artificial grass of the second generation.
- **1994**
- **Inconsistent quality and safety issues**
- Due to the poor quality and safety issues, all artificial pitches used in the English Premier League before 1994 are replaced by natural grass.



3G Turf 「三代草」

The history of artificial sports turf in football (cont'd)

- **2001**
- **The FIFA Quality Programme for Football Turf**
- FIFA and UEFA start a quality assurance programme for artificial turf. The aim is to develop an industry standard for artificial surfaces used for football.
- **2003**
- **The first FIFA tournament on football turf**
- The FIFA U-17 World Cup in Finland is the first FIFA tournament in which one of the four host stadiums is equipped with football turf. Ten matches, including the final, are played on a first-generation football turf pitch.



3G Turf 「三代草」

The history of artificial sports turf in football (cont'd)

- **2004**
- **Laws of the Game**
- The IFAB (International Football Association Board) agrees to address football turf in the Laws of the Game. Only surfaces which are FIFA 1 Star RECOMMENDED, FIFA 2 Star RECOMMENDED or IATS tested may be used for international matches.
- **2007**
- **FIFA U-17 World Cup in Peru**
- The FIFA U-17 World Cup in Peru is the very first international football tournament to be played entirely on football turf. The decision is taken based on the local requirements of a dry climate with occasional heavy rainfall. The pitch also provides a useful legacy for the country.



3G Turf 「三代草」

- **The history of artificial sports turf in football (cont'd)**
- **2009**
- **FIFA Preferred Producer**
- FIFA implements the FIFA Preferred Producer initiative in order to further increase the quality of football turf and protect the end-user. Preferred Producers meet the FIFA quality criteria in all areas of football turf pitch construction.



3G Turf 「三代草」

Home **News & Media** **History & Events** **Tournaments** **World Rankings** **Education & Training** **Laws & Regulations** **About IRB** **IRB RUGBY WORLD CUP**

Fixtures & Results Unions Total Rugby TV and Radio Rugby and the Olympic Games IRB Live

IRB World Rankings
09 December 2013

1(1)		NZL
2(2)		RSA
3(3)		AUS
4(4)		ENG
5(5)		FRA

[more](#)

RUGBY AND THE OLYMPIC GAMES

TOTAL RUGBY
THE IRB'S OFFICIAL BROADCAST CHANNEL

Latest Audio

Audio

- 13 December - South Africa Sevens Review including Nelson Mandela tribute
- Listen to this week's Total Rugby show
- 10 December - Zinzan Brooke on Kieran Read
- 09 December - International referee Jonathan Kaplan on his retirement
- 07 December - Dubai Quiz

[more](#)

HSBC Sevens World Series - South Africa
Sevens Mandela Day a memorable tribute

Latest News

- Wednesday 11 December 2013 - Press Releases
Boost for female disciplinary officers
- Wednesday 11 December 2013 - Olympics
Penitani in frame for Youth Olympic Games

Latest Documents

- IRB Handbook
- Malcolm Moore and Carel Swanepoel decision
- IRB Match Official Appointments for RBS Six Nations 2014

IRB RUGBY WORLD CUP 2015

HSBC Sevens WORLD SERIES

ANTI CORRUPTION
KEEP RUGBY INSIDE

<http://www.irb.com/>

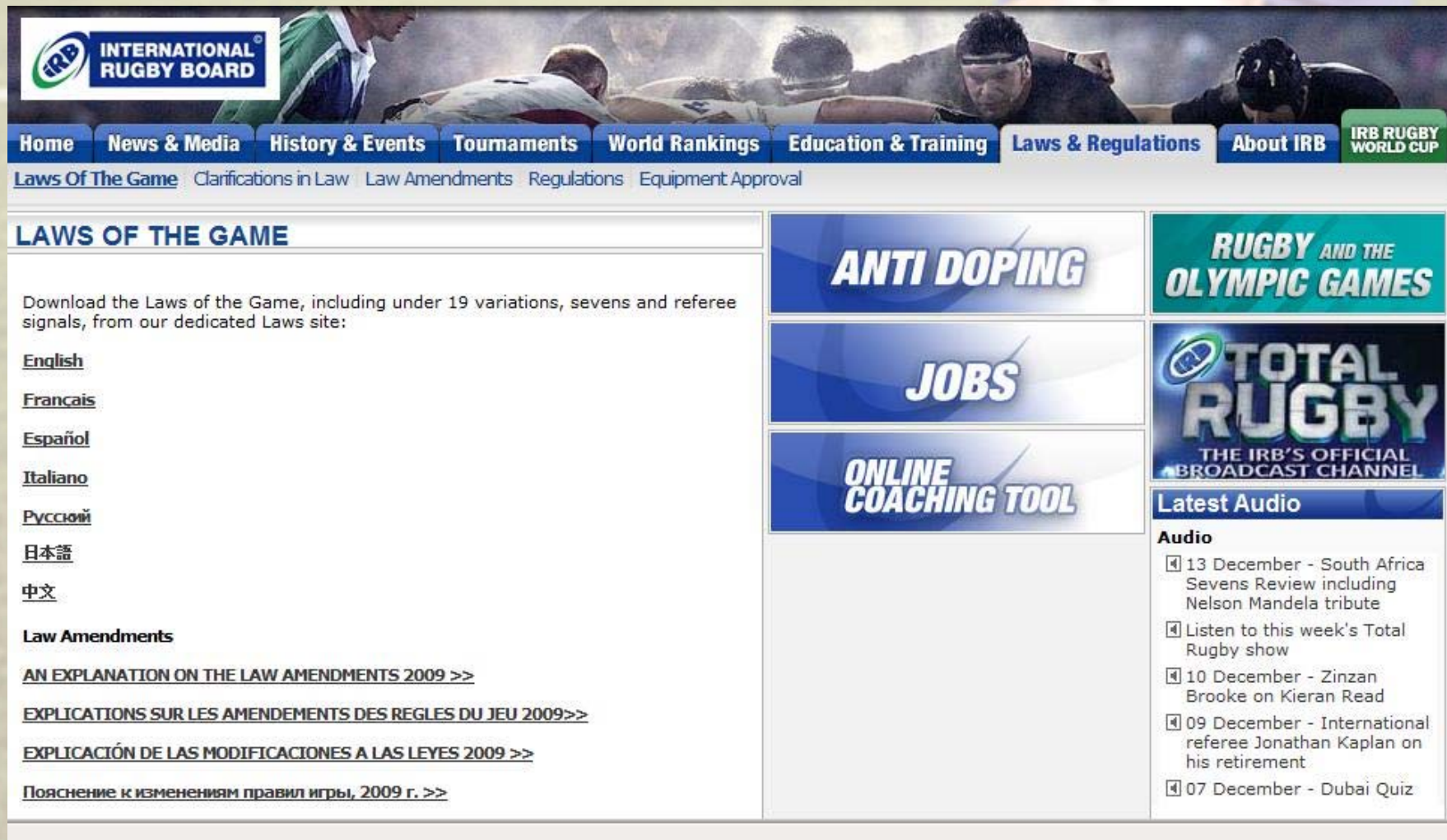


栢溢名基康體設備
Parks Supplies Co., Ltd.

4th Seminar on Practical Turf Management
Natural and Artificial Turf Pitches - Your Choice



3G Turf 「三代草」



The screenshot shows the IRB website's 'Laws of the Game' section. The header includes the IRB logo and navigation links: Home, News & Media, History & Events, Tournaments, World Rankings, Education & Training, Laws & Regulations, and About IRB. A sub-header for 'Laws Of The Game' includes links for Clarifications in Law, Law Amendments, Regulations, and Equipment Approval. The main content area is titled 'LAWS OF THE GAME' and provides a download link for the Laws of the Game, including under 19 variations, sevens, and referee signals. It offers language options: English, Francais, Español, Italiano, Русский, and 日本語. Below this, there are links for 'Law Amendments', 'AN EXPLANATION ON THE LAW AMENDMENTS 2009 >>', 'EXPLICATIONS SUR LES AMENDEMENTS DES REGLES DU JEU 2009>>>', 'EXPLICACIÓN DE LAS MODIFICACIONES A LAS LEYES 2009 >>', and 'Пояснение к изменениям правил игры, 2009 г. >>'. To the right of the main content, there are three blue buttons: 'ANTI DOPING', 'JOBS', and 'ONLINE COACHING TOOL'. Further right, there is a section for 'RUGBY AND THE OLYMPIC GAMES' and 'TOTAL RUGBY THE IRB'S OFFICIAL BROADCAST CHANNEL'. Below this is a 'Latest Audio' section with a list of audio clips: 13 December - South Africa Sevens Review including Nelson Mandela tribute, Listen to this week's Total Rugby show, 10 December - Zinzan Brooke on Kieran Read, 09 December - International referee Jonathan Kaplan on his retirement, and 07 December - Dubai Quiz.

<http://www.irb.com/lawregulations/laws/index.html>



栢溢名基康體設備
Parks Supplies Co., Ltd.

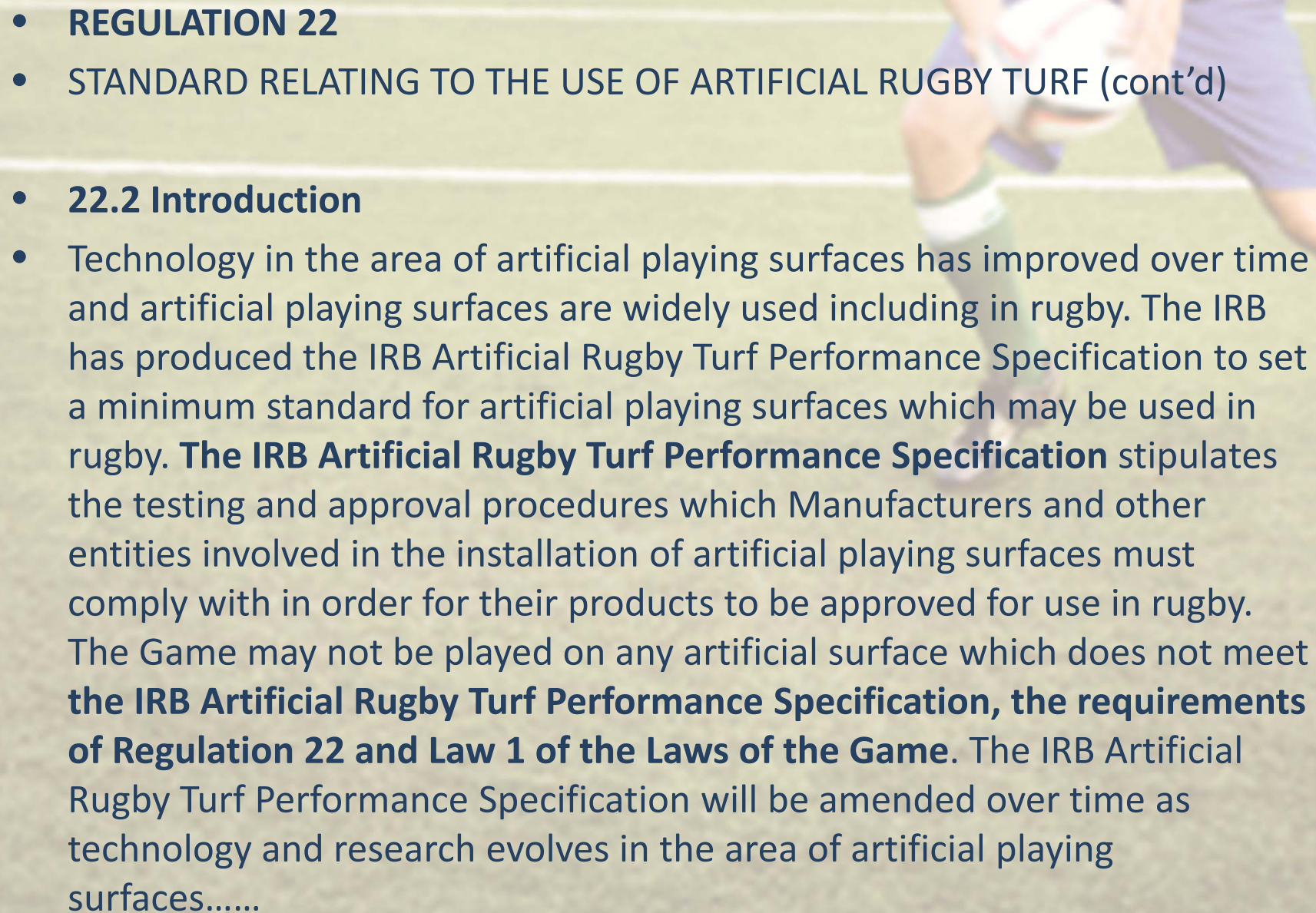
4th Seminar on Practical Turf Management
Natural and Artificial Turf Pitches - Your Choice



3G Turf 「三代草」

- **REGULATION 22**
- **STANDARD RELATING TO THE USE OF ARTIFICIAL RUGBY TURF**
- **22.1 Definitions**
- For the purposes of this Regulation 22 the terms below shall have the following meanings assigned to them:
- **Artificial Rugby Turf** means an artificial playing surface for training and playing the Game, which meets the requirements of **the IRB Artificial Rugby Turf Performance Specification and Regulation 22.**



- 
- **REGULATION 22**
 - STANDARD RELATING TO THE USE OF ARTIFICIAL RUGBY TURF (cont'd)
 - **22.2 Introduction**
 - Technology in the area of artificial playing surfaces has improved over time and artificial playing surfaces are widely used including in rugby. The IRB has produced the IRB Artificial Rugby Turf Performance Specification to set a minimum standard for artificial playing surfaces which may be used in rugby. **The IRB Artificial Rugby Turf Performance Specification** stipulates the testing and approval procedures which Manufacturers and other entities involved in the installation of artificial playing surfaces must comply with in order for their products to be approved for use in rugby. The Game may not be played on any artificial surface which does not meet **the IRB Artificial Rugby Turf Performance Specification, the requirements of Regulation 22 and Law 1 of the Laws of the Game**. The IRB Artificial Rugby Turf Performance Specification will be amended over time as technology and research evolves in the area of artificial playing surfaces.....





Characteristics of 3G Turf

「三代草」的特徵

- Sand and rubber infilled
沙混合膠粒的填充物
- Long pile height
草絲較長
- “Skin-friendly”, low sliding resistance
「皮膚友善」，低滑動阻力
- Commonly padded
一般有底墊
- Designed mainly for football and rugby
主要為足球和橄欖球運動而設計
- Others
其他





4G Turf 「四代草」



La Salle College, Kowloon



栢溢名基康體設備
Parks Supplies Co., Ltd.

4th Seminar on Practical Turf Management
Natural and Artificial Turf Pitches - Your Choice



Greenfields 31

4G Turf 「四代草」

- Non-filled
沒有填充物
- Medium pile height
中等草 絲長度
- “Skin-friendly”, low sliding resistance
「皮膚友善」，低滑動阻力
- Commonly padded
一般有底墊
- Designed for football and multi-sports
為足球和其他運動而設計
- Others
其他



4G Turf 「四代草」



La Salle College football pitch upgraded from 2G Turf to 4G Turf in 2009

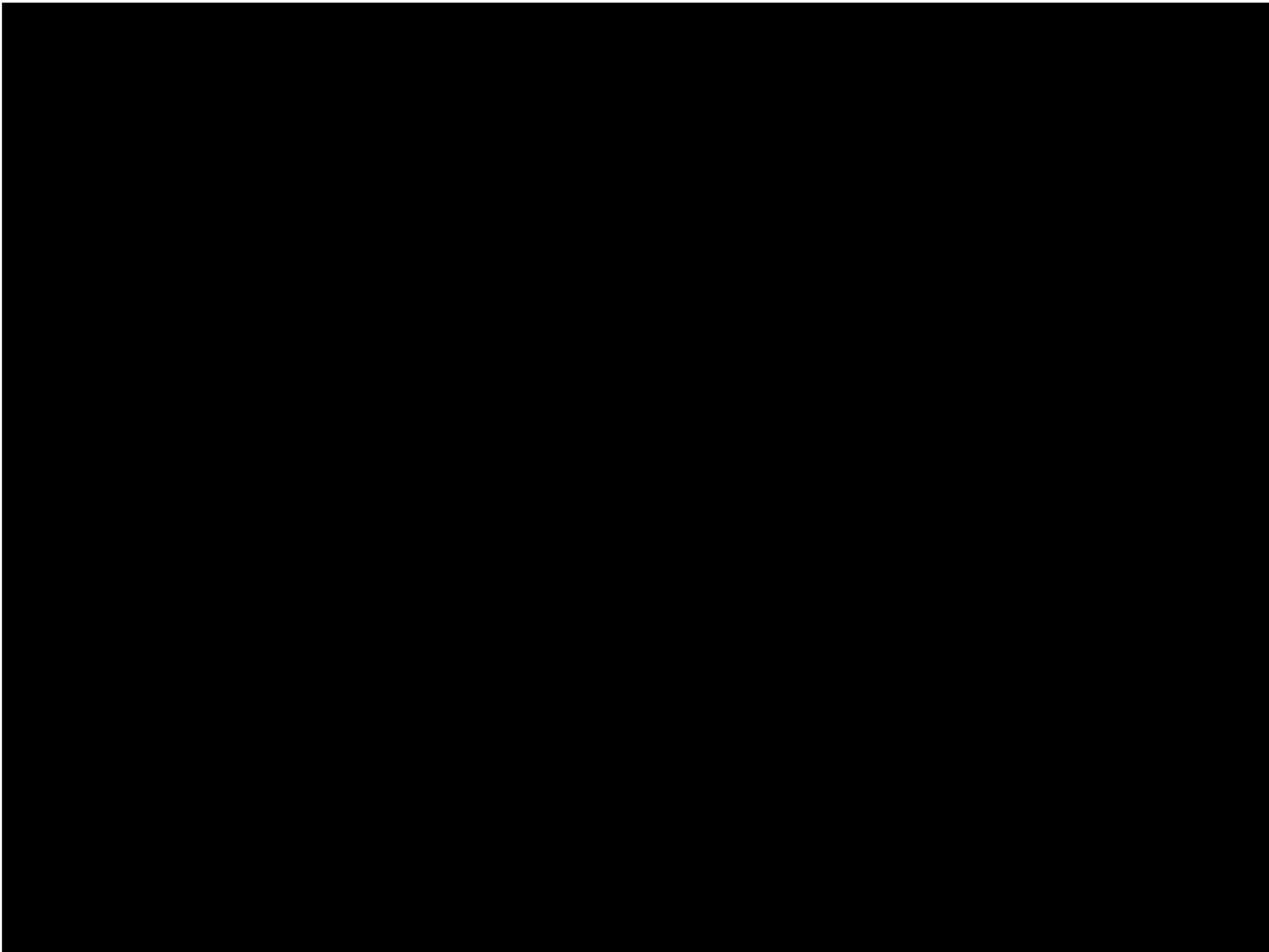
喇沙書院足球場於2009年將其「二代草」升級為「四代草」



栢溢名基康體設備
Parks Supplies Co., Ltd.

4th Seminar on Practical Turf Management
Natural and Artificial Turf Pitches - Your Choice

 Greenfields 33



Which “G” is better?

哪代草是最好?

- The QUESTION is: For what purpose?
先問一句: 用途為何?
- Is 2G Turf any better than 3G Turf?
「二代草」比「三代草」優勝之處?
- Yes, 2G Hockey Turf is better than 3G Turf
是, 「二代草」較「三代草」適合用於曲棍球運動



Which “G” is better?

哪代草是最好?

- The CONSIDERATION is: Are the required resources available?
另一考量是: 有否足夠資源?
- Is 3G Turf an unwanted product?
「三代草」是否多餘的產品?
- NO, OF COURSE NOT!
當然不是!
- 3G Football Turf could be a much better solution than natural grass
「三代足球草」可較真草場達到更佳效果.....



Which “G” is better? 哪代草是最好?

- Resources required to keep 3G Turf well:
維護「三代草」所需資源:

— TIME 時間

- Typically 4 hours or more per week for regular maintenance
每星期需4小時以上定期維護
- e.g. brushing of turf and refilling of infill for every 35 hours of play
如: 每使用35小時，需梳整草場和重新注入填充物料



Which “G” is better? 哪代草是最好?



— MONEY 金錢

- Brushing and refilling cost HK\$200,000 plus p.a.

梳整草場和重新注入填充物料所費不菲，每年花費港幣20萬元以上

— ATTENTION 注意力

- Rubber infill spills and splashes, and is disturbed by rain

填充用膠粒會流失和四濺及被雨水沖亂





栢溢名基康體設備
Parks Supplies Co., Ltd.

4th Seminar on Practical Turf Management
Natural and Artificial Turf Pitches - Your Choice

 **Greenfields** 39
artificial turf

Which “G” is better?

哪代草是最好?

- One last QUESTION: Whom does the pitch serve?
最後: 誰是草場的使用者?
- 4G Turf is ideal for owners/operators
「四代草」對以下場主/營運者最佳:
 - expecting relatively “trouble-free” pitches requiring very low maintenance; AND
期望維護需求較少的球場之人士
 - not requiring certification of FIFA Star Recommendation
不需FIFA Star Recommendation認證之人士



Which “G” is better?

哪代草是最好?

- 4G Turf is better for who?
「四代草」對誰最好?
 - Schools 學校
 - Social Clubs 會所
 - Municipals that run neighborhood pitches
社區運動場
 - Many others
其他



The Conclusion

Various Generations of artificial sports turf

總結 – 歷代人造草運動場回顧

Each of the generations of artificial sports turf has its own merits
各代運動用人造草各有優點

KEY to the success of the pitch with 2G/3G/4G Turf:
二代/三代/四代草場成功要訣:





栢溢名基康體設備
Parks Supplies Co., Ltd.

4th Seminar on Practical Turf Management
Natural and Artificial Turf Pitches - Your Choice



Greenfields
Artificial Turf Solutions



**La Salle College, First 4G pitch in Hong Kong
Since 2009**





栢溢名基康體設備
Parks Supplies Co., Ltd.

4th Seminar on Practical Turf Management
Natural and Artificial Turf Pitches - Your Choice



Greenfields 45

A Review on Various Generations of Artificial Turf Pitches

歷代人造草運動場回顧

謝謝！

Thank you !

Vriendelijk Bedankt!

