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TSK TECHNICAL REVIEW

TSK 月島機械株式会社

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論文1

焼却廃熱を有効利用した
加温濃縮脱水システムの開発

論文2

ダイナミッククロスフローろ過装置
BoCross[®]フィルタ

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Nitrogen removal technology from side stream
by Anammox process.

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Development of Vortex Flow Crystallizer

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Acceleration of DX by the impact of COVID-19 and introduction of the TSK ICT/AI technologies

Abstract

Due to the effects of the latest coronavirus infection "COVID-19," digital transformation (hereinafter referred to as DX) is accelerating worldwide. In addition, our company (TSK-G) has launched the "ICT / AI Utilization Technology Development Project" to promote the use of digital technology and ICT technology, including AI.

As project activities, we aim to contribute to society through environmental protection and achieve sustainable development using "remote monitoring and control," "image recognition," and "time-series data analysis" technologies.

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Laser scanner in plant design

Abstract

A laser scanner is a measuring device that measures distances at a speed of about Million times/second, and the measurement distance is about 100 m. This device is currently available worldwide as it can safely measure high places and a wide range in a short time. It has been widely used in recent years; it has been installed in automobiles and iPads and is becoming a standard technology.

Herein, we will introduce the operational status of the laser scanner introduced in 2018 in collaboration with the Plant Engineering Department of the Environment Business Division and TSUKISHIMA Technology Maintenance Service CO., LTD.

Essentially, the laser scanner is a tool that captures the real world into the virtual space. We will also introduce the potential possibilities for future plant design.

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Application of high-speed mixers in cosmetic industry

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Evaluation of TM auto-strainer installation and demonstration test

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Abstract

In some facilities, such as sewage treatment plants, recycled sewage water with low rate and stable quality is used for various purposes. In contrast, recycled water causes nozzles and strainers (20–60 mesh) to clog because of suspended solid (SS) contained in water. Therefore, we requested the TM auto-strainer to stabilize the function of the facilities and make the maintenance easier. Some installation cases are shown below.

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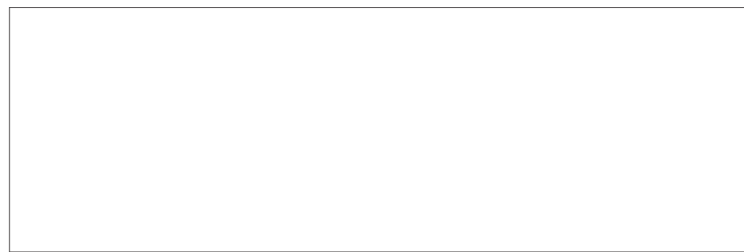
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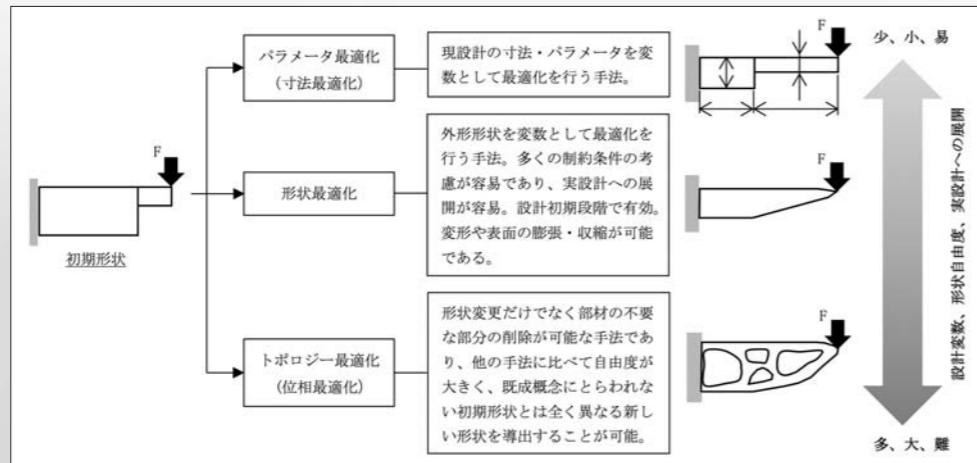
xaŠt

yý ñéÆçÿçµwH„\$Gvæ›;q`o @ýhs±VM¯›s`^VUô±z•ê—§=t(U"\"Qw²íU\•±pŽí
 t{Š'•oM}{f-7&=U[xzf-UÁÀ¿wx^=t''²—~@p=•zœÖ tq'~•sMÁ² iUDópK"lq
 T'z¼í²íTm~µÄ_nUaRDósU[q_ ±•}{

f - 7 & = U[

yíMwf-pxè\$•MÿUó: O`z f•U"MtÄè"Á:Ñw tK"-µU M{ü^;+MFw7&f-δJ}«
 tq•yz è\$tx —z!•zO"w7==srUK"zMÿtxü^;+qwžüs†srUK"{} \\pz —•!•)-^X'`O
 q\$S›í["qz O"ž¿ó•z žü-tÖlo`±OÄè"Á:ÑδJt≠VKh"{} f\pz ^±_±sžç°æ¶Ü)æ-`of-"7
 ›sgb" f-7&=U[Uz Mÿ›-h`mmó:wè\$t0`oiãipwq•hr›{Š" hŠw @s ^qβQ'•}{ f-7
 &=U[tx tíw'OsYæ¿ÄUK"{}
 -Óé-ãÜt"x^\$tsg› Š'•"hŠzf-rp t'" "&`wU|i›_npV"{}
 ~žç°æ¶Üt'"sgwhŠzf-rp wœÖ t(È^•sM7&‹›sgpV"{}
 ~íáY"»]qt/)S•i Qsr›D¹=pVzA:wÜ" ^•™≠› w±Ü"ÄtÆ;pV"{}
 f-7&=ü"

yf-7&=w Oxs\$ tÔb
 'Otü" ^•}{



\$ f-7&= Oü"
 'JH \$BUFHPSZ PG EFTJHO PQUJNJ[BUJPO NFUIPE

rs-ç"Ów f - 7 & = U[•w "Ê^

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 [›È^d"\qpz U|^Áwx^=z a¼w¼í²íz ~µÄ_nUDóqs"{} qOzçb¹ÑÄç£žt'"Áá žç•G¶qw
 ž%Z€›è`o@L\$S-;MOWU|› ŠoM"{}
 íáY"»7&=UÁÄ«
 y&;DqwUÁwhŠz "ÊœiíáY"»7&=U|Ä«›ít°pb"{} \•'x³Uáè"³ãï¹ÑÄqwÈ Uz±\$0›p
 K"{} ³Uáè"³ãï¹ÑÄç•AL›\$ ™\$ tÔb{

%CŠæ Z€%Cæ rs-ç"Ó
 Š 2\$

ày]Óé•µw7&=U|Ä«
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 ~7&=w^; •ÿ~µÄTmôQósày]w"7›{Š"{}
 --;Ä"ç • @7&f-§ 1ÑÄ- '®130-5-
 ç xY6Óé•µ³Uáè"³ãï¹ÑÄ£
 ®&YDç7&f-§ 1ÑÄq130
 ~ w í"Ñ£"µ£
 ~è\$ •7-gæ^:z7-à>"z7GyZ÷"
 ~!; •gæ^: ç ^™ ^£ zÑY"Áz
 æØ á"à>"z vz
 ~MÿÚE •yZ÷µa¼ñSz æØ á"ä"z vz
 ~RL •Mÿ›-h`è\$›aRb"rwBùpK"
 \$ w'Os„í\$U"~'•h{
 fw±T'z\$ w7&sày]U"~'•h{
 \•xÖÁãíU[q%aALpKlh{t
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 ~7&=w^; •µÓè" w-k@L›C4b" hŠwTvX
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 ~!; •TvXÖ^zTvX "
 ç+ØT'wô^z T'w'm£
 ~MÿÚE •TvX›žç •^Rb"{}
 X w:› NNŽíqb"{}
 ~RL •-k]Ž›\$ tztvXw±!›\$
 tÔb{ ±hz7&=²q™wv.rsAL›
 f•g•\$ q\$ tÔb{7&=²x"µv
 •wGVs "U_`•hUz7&=™x "
 Un—`h{7&=²t0`oz ÚM²7G
 S nzy— æ nzTvXÖ^
 nwalqslh{

\$ xY6Óé•µ³Uáè"³ãïU|a q74AL
 'JH &YBNJOBUIPO QSPDFTT PG TUFBEZ TUBUF QSDFF-7k]Ž \$
 TJNVMBUIJPO BOE SFTVMU
 \$ 7&=-%ALw„í\$
 'JH 4DBUUF S QMPU PG PQUJNJ[BUJPO DBMDV7MFBSUJJDONS FQWBSSE TQFFE PG 'HBT 7E5G PSEFM VQXBSE TQFFE PG HBT

\$ Úí²V S 7&=² \$ Úí²V S 7&=™
 'JH 0VUMJOF ESBXJOH PG DPPMJOH UPXMF S1BSBNFUFST

S~"t

y mwÄ «T'f-7&=U[txz¼í²íTm~µÄ_nUaRDósUÁi³βçUK"qβQoM"{} ™xzíáY"»7&
 =>%CŠE•íŠEt&;'sU'í srqwz±UÁ•æMz;QUK"U[•qðŠoMvHM{
 y±hzf-7&=U[w7ý^² ç Ú¶6qwÈ^ù~dsr£ ›Đ*mmz "x SUôXQó~³U84pV" Ý7&=z Ä
 Úé'"7&=t'üÄ\$ t "ÊœpMVhM{

e” TM Õ = \$ TM

Óà Û«μÒÛqpyU[æy ›ÿ ò

1. xaŠt

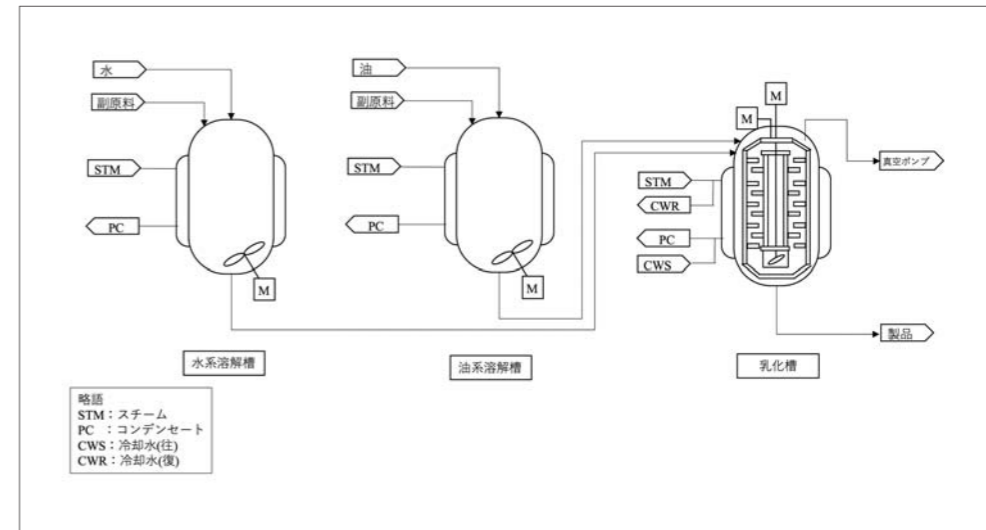
yX w¥z-ý% 8zÆP71zœ{Hwæt+x w'Ot _“ù~sM ›~b
 t?UMXm«K“†b{
 y hiz +q x«Žpz „∅ÆQNw—› “”qÕ=’o _“ùO\qUpV†b{ ^tz
 ô ÝiU[›É^ù~d”qz Õ=rgt^’s”ÇCA(›)Q”\qUpV†b{ Š~ã
 Ûpxz Õ=›@”è”Átpbô Ýi;›;MhÕ=f’w°z›]°pMh`†b{

2. Õ =

yÄ•V z ÚäÉ”¶z ³βiÓ”srÕ=›b;`ha¼xz †^t²h jwSx’OT’
 S•b^†pw, ”q\—p=TdsM«wtsloM†b{Õ=xz @+q w’Ot“Mt9
 r’sM÷iw°MU w°Mt•ls÷#q’oü,`h«w~ q [P ^•oM†b{
 yÕ=^d”hŠtxz;•\$s@... —t“÷#›•l=b”MO•z,∅ÆQN›;Mh
 úg=¶\$sMOUq’•†b{
 y+q ›~¿ÓwætÕ•”qz+iq itüm`†b{+q qU€b”„∅pxz÷.
 °æqz±’oü —srwi“^;Uÿ<b”hŠz æÉçª”UôXÆ† sÝ6ts
 “†b{ \wÝ6›stb”hŠtz,∅xs”,X-^Xs—Oq†b{ fwALz+q w
 €b”∅uU7—ts†b{zO)UK”hŠzOM+x<tzOM xítüT•zAL
 q`oí<tümb”\qts†b{
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 ¼üúpx„∅ÆQNw\q,Õ=NqMM†b{Õ=Nxz+tÄ›^•bM+Ž,qÄ›
 ^tXMÄ+,pK”§çøĩŽ,›‹mµµÄç=úúU;M’•†b{Õ=N›;M”qz
 „∅pxz+ tx+Ž,U²Z’•”\qts“z,∅w+xzÕ=Nw+Ž,æüqi“
 ^;UK“æÉçª”x† =`z,∅Á—Uÿ<`†b{°Mw iw„∅‹Õ=NwÄ+
 ,qi“^;b”\qpz æÉçª”U† =b”hŠz,∅Á—Uÿ<`†b{ \t“z
 UÕ=Ntô~•hÝ6qs“+ætü„`z_TZÍz U9r`h’Ot_Q†b{ \w
 «pxz #Uz+ætü„`oM”wpzPJM JO XBUFSq`o O`oM”wpz \w’Os
 Ý6›•ó; pP X q~q^•†b{ot+#U ÷ætü„`oM”Ý6xX P q
 ~q^•†b{
 y(ŠsU’z=1+pxX P xz `lq“q’sU’^c^c^MzP X xz ^lz“
 q’sU’O”SMUK”qMh@LUK”Opb ø x=1+srqx M\Æ›
 `oM”wpîòxsMwpbU£ {^txX P X •P X P ‹K“†b{
 y\lp’O•Xô §i;wJÕpb{Õ=ü„`h9÷tô §i;pôM@... —›)Q
 ”qzÜ„`oM”÷# xz@... —t“—^Xs“†b{§i;s8:z§iì ›!Éb
 ”\qt“z{ wMšUDópb{÷# ›!Q”\qpÕ=a¼w@óU!“za¼
 t\•†ptsMÇCA(›)Q”\qUpV†b{

3. ppÓäi Ä y Ä«

ypp§i;xz=1¼zĩ¼z=¶¼z@¼q;c“x^†_†pbUZ;+İRxxz+
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 Ñé”›Õ`†b{ij%xxz+z S’|•’t9r^d”ij%qs“†b{9rçf•g
 •tozµj% x ù^•zC9^•o9r^•†b{æçp~’•h9r÷xÕ=çt ù
 ^•zô §it““Õ=rg^•†b{Õ=çxzô §i;wž¼xPÜ«±” §qÿ §
 i;wíÄçÜ«±”w ;w§i;›`†b{ ž¼xPÜ«±” §xzÕ=÷t@... —›)
 Q”\qpza¼{ srwa¼¼¼i›Mšb”pÄ›Lh`†b{°MzíÄçÜ«±”xz
 ôêSsç°tSMoz ž¼xPÜ«±” §t“Át\$@... —›!Zh÷›ç¶.te
 ^d”\qpzç°÷w÷# ›É°tb”pÄ›Lh`†b{t ì Ýi^•hwjzÕ=
 a¼U~’•†b{a¼xzÕ=ç æ“ Z^•†b{ a¼ Z™z§i;q0+íæw—
 æüU yâÇ;Ät“íç`z to°æUšÜ^•†b çšÜx\$*1‹Dópb{ \w
 Ôùxz ž¼xPÜ«±” §pxsX«æžµ»ž §qMOpp a¼qs“†b£ {



'JH yÕ="tÑé"

4. S~“t

yppwÕ=ç§i;xzô qÿ qMOS“MwÕt›\T’sU’z Ôr\Tp
 _“ù~sM m›¥XA|mZ”S ;M^doMhiMoS“†b{
 yŠÔxzbq›§i;T’§QoM”Óà Û«μwÕ=§i;w]°pp`h{

€B Y Z/• }æÄ¼yÕ=U[w,Ä çisqµÜç³äifÉ ÕŠ=1¼U[q½ H è H ø QQ ç £

— a

yŠ-áÜpxz t p»²ZtDa;•-ç"ÓwU[w
 °™q ›°p`‡b{H sèw swÂ"Úx ®-a- U[p
 b{ Èqþ} %Da;•-ç"Ów-aU[w ›Äxz•ù
 ptz,o0 üúwc"U ĵXz0 ; ‹‡xt M\q
 pb{Š-áÜpxz; ›G‡Ttütü"°p`‡b{
 y‡cz -aqxrw'Osó•â^›^bwp`•OT•`t
 { U÷‡tRY`oM"(w)µâæqMMz \wµâæ‡w{
 ú)~Pt"ümb"â^)-aqMM‡b{‡hz%7t>
 .‡w¼µÄsw{ ú)ümb"â^(-aqMM‡b{ \wq
 V-axz tO-zý-zya-st"æ~•‡b{sSzó
 6\$t%amâæ‡w{ ú)-Ppümb"â^p`z ú-
 t"æ~•"(wxz ® úüm- tüz'‡b{\w'Ot
 [nZ"q-É`M'Ot‡Q‡bUz -aâ^xèp_o`T
 "z‡xt³iÓçp ùso•â^pb{Ü++wÑŸç»zi
 \`wÚâzβ‡;w‡žÑŸç»"s(-PpK"z Ôx\Æp
 ‹-aâ^xæ~•oM‡b{
 y\w'OsZ Ôxt ùs-aâ^w°™xyXzDi²T'b
 ptS wümp-aâ^Uæ~•oMhqt~•oM‡b{Z
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 ‹r!~'sMqMlhq\p`•OT•sSz»Ä;q`o-
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 +w-ap--aUæ~•oMh'Opb{ HDts"qz ä"
 éĵí•žŸæšpZqOp(-;^•oM"ÑŸç»"Óèµ•
 ÁáÜÑŸç»"w%CUæ~•z \`w-a;Uí+üú•
 í•üúp°æ-;^•"Ots"‡`h{žŸæš pIVh
 °"çÁâĵ³át"z %CUC \$t œiqt~•oM‡b{
 HDw²Rtxzí+üú•í•üútv'cz ^‡_‡sü
 úpzqOp(-;^•oM"-a;tÜM w»Ä;-a;U
 -;^•"Ots"‡`h{
 yÍGU-aU[S'|-a;wG‡Ts°™pbUzDa;•
 -ç"Ów-aU[w°™xrOp`•OT•^‡_‡s»Ä;-
 a;Ua^^•i`h HD²RxxzDa;•-ç"Óx%a
 {÷ümâ^pK" úüm;›a^`oS"‡`hUz ‡iŠ
 " \$tx-a;ÄÄtx€"oM‡dœ{Da;•-ç"Ów
 ÔùzŠ` \$t-a;ÄÄt€Ö`hwxxz âž Ü-
 pT'-a;U[›°Ä`Ö`hžñts"‡b{ \wit`Ö`
 h;+w°mwÖçÄÑŸç» ç-íøæÜÈ í-a;£ ç\$
 £xzÍ<+wd+f'q'o>;^•‡`h{ ‡hz ½ w‡.~
 =¶üúp<>;^•z½ üúpxqOp<b ^•oM‡b{

^ÄÄŠæ o.;+U[æ Óé•µ-ç"Ó
 à Hb
 fw™z- tÔb'Otz âEz âEtTZoí'
 q,ž‡pwU[›‹Ö`z Xw-a;›a¼ tCQoV‡`
 h{\`w AU[w‹Öxz ä"éĵí•žŸæšswœ
 U[›©βĵ½žĵÓb"Ípž" Äòp`h{‡hz‹Ö`hU
 [›‹qt xwxp%oC(æloV‡`h{ \wiEt xp%oC
 `hE`\$s; w°mtzôd+ó-qG =>iq`h%\$
 ÑŸç» ç-íøæÜya;İçVÑŸç»"Óèµ£ ç\$ £U
 K"zqOp<í+üúpw -a¼w°mpb{Da;•Ä-
 ç"ÓwU[Uœ tâMmMh âEžñxz xpt'
 "Òâĵ³âžĵÓ•%CUµúts"‡bUz7Üpx#0,&-"
 (NC) pUDa;•Ä-ç"Ów-ç"Óqpts"z±Ò

図1 ベルトフィルタ

図2 DC フィルタ

図3 BoCross® フィルタ

Nw{ t<0 pV"#P\$SPTT §ÑŸç» ç\$ £sUa¼â
 ĩÆĵÓtC~"‡`h{\w'Os°™}&ozqO‡pt½
 üúizp<z^Äüú• ; ŽÍw;+wòÖîwUK
 "‡b{çÖ•ê-wðJpZq O\•‡p t;+wb,o> "
 {loM"-ZpxK"‡dœUz•ù ßqz,o<‡xt X
 w; wòÖîwUK"qMQ‡b{
 y\w'OtDa;•-ç"Óx w-a;wîwUK"‡b
 UzNSçÖwA{tüt`do0 `oVhALtq¥~•‡b{
 ‡-a;xžG‡Tt-aMÜpzO—aÜzí-aÜzC
 y~yad+Üw mtüz'•‡b{sSz -a;w‡txí
 GwMOpwü`wÉ`MzO--aqyad+É`ù`dh
 ÖçÄÓèµ\$ £w'Os;+K"‡b{\`tüt`^•"
 -a;xz- tÔb'Otf•g•b:~=:UK"z r•U
 •oM"qMO~ZpxK"‡dœ{fwí'wÄèĵiÄ•rgú
]qW&Qtüt`doz- •%CUæ~•‡`h{ ™z M-M
 -s-a;tí•";qUKIhMtxz -aMÜ›-Y`oM

図4 ベルトプレス(高効率形ベルトプレス脱水機：上、濃縮分離型ベルトプレス脱水機(イメージ図)：下)

図5 水平ベルトフィルタおよび圧搾ブロー型脱水機(イメージ図)

hiVz rw'Osg p- ^•hTÝp`oMhiZ"qØ(
 MTq¥M‡b{-aâ^xzŸ`Uèp_o-ÝpV" IçV
 •bMU[üúpbwpz ½βèĩ`oXi^M{-g ›÷
 "<["q-aMÜžžtZÈ ~ĵĵ½rgswá8MÜ•{
 úw ZMÜqwfW„Twg U_QoX"tq¥M‡b{
 yqODa;•-ç"Ópxz Da;•Äz DaÚ³ĩ•"çµ
 çÖ£z#0,&-"(NC)w mwqpp-a;›b `oM‡b{
 ‡pp‡rp Uzý`MU[w%oCtÄ"oM‡b{²x
 xzDa;•Äw½';-a;w-hÄĵ›rp`z t+ Ö
 çÄÑŸç»S'|yaÖé" d+;wÖâĵ³âžĵÓs'|
 G =wU|›`oM‡b{ + ÖçÄÑŸç»S'|yaÖé"
 d+; ç\$ £xzÉÍ?'P%ostE`^•"Osz{
 U ™ Nw{ wšÜd+â^t&;^•";+pb{Ö
 âĵ³âžĵÓ-G =t"z•ê→òš"OR-`oM‡b{

表1 る過技術導入例(1960, 70年台)と関連自社開発製品例

表2 る過方式と特徴

(※1) る過は重力式、脱水が圧搾式
 (※2) 濃縮る過もしくは、ふるいる過をする装置

会社概要

É¶	Da;•ÖÜqþ	φ546,*4)*. " ,*,** \$0 -5% £
E- þpÖ	ñT [i	
ÑÀ	ád	i i

¿ŠÚ	/ a
HÀ»:	Ê-ç"Ó Ê& á D¼qO£
Íð	o. • / yÈA • /ç á D8£

ÄÄt

Šþ	ß 5&-	f~N¼ àV, y'"9
f~šþ	ß 5&-	f~N¼ àV, y'"9
GUŠþ	ß 5&-	GU¼¼ ààÉ y'"9 φÜ~¼™Éİç£
s~š3	ß 5&-	s~çzàzāÚb y'"9 φ.%9s~İç£
çFš3	ß 5&-	çFçh?àŠÉ y'"9 φ4,çFİç£
#¿š3	ß 5&-	#¿ç¼¼ àCEÍÉ y'"9 çæµ Ä öİç£
Éy0š3	ß 5&-	Éy0¼¼ àÉúÆ y'"9 φ¿-İ&4İç£
¿aš3	ß 5&-	¿aç¼¼ àŠÉ y'"9 φ¿a İÄµ£
ñ,š3	ß 5&-	ñ,¼¼ àà• y'"9 φGü~ İç£
-ÄæÄt	ß 5&-	-Ä]Ü4ç€Ó y'"9 ç-ÄTæf-İç£
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〈海外〉

54,ÉÉ±O»Ä¿t
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54,ßšç»±O»Ä¿t
 5TVLJTIJNB ,JLBJ \$P -UE +BLBSUB 3FQSFTFOUBUJWF 0\$•DF
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 +BLBSUB *OEPOFTJB
 5&- "9

54,ä"é¿í±O»Ä¿t
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 5&- "9

54,Üil±O»Ä¿t
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 " 3BK)PSJ[PO 3BNEFW 1BSL 3PBE .JSB 3PBE &BTU
 5IBOF .BIBSBTIUSB *OEJB
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〈海外関連会社〉

54,πí'Çžæī~» äī Äç Ö£
 54, &/(*&&3*/(5)"*-"/% \$0 -5% ú5&5ü
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#0,&- (NC)
 5VMMBTUSBF ,BSMTSVIF (FSNBOZ
 5&- y'"9

Daπí'Çžæī~Üè"ž ç Ö£
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 +BMBO "NQBOH ,VBMB -VNQVS .BMBZTJB
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S ð M

Éqþ

DaÄ«ÉY İÄ±"İµ ç Ö£	ß	f~N¼fà\$İ çDa;•iEİç£ 5&- y'"9
±İ±"Üç ç Ö£	ß 5&-	çæ]Üªç<t' y'"9

Da ¥πí'Çžæī~ ç Ö£	ß 5&-	f~N¼ àV, ç.%9V,İç£ y'"9
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DaÜ³."çµ ç Ö£	ß 5&-	f~N¼fà\$İ çDa;•iEİç£ 5&- "9
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Daİ'Éµ±Ü" Äç Ö£	ß 5&-	f~N¼ àV, çDa;• çÖ£º£ 5&- y'"9
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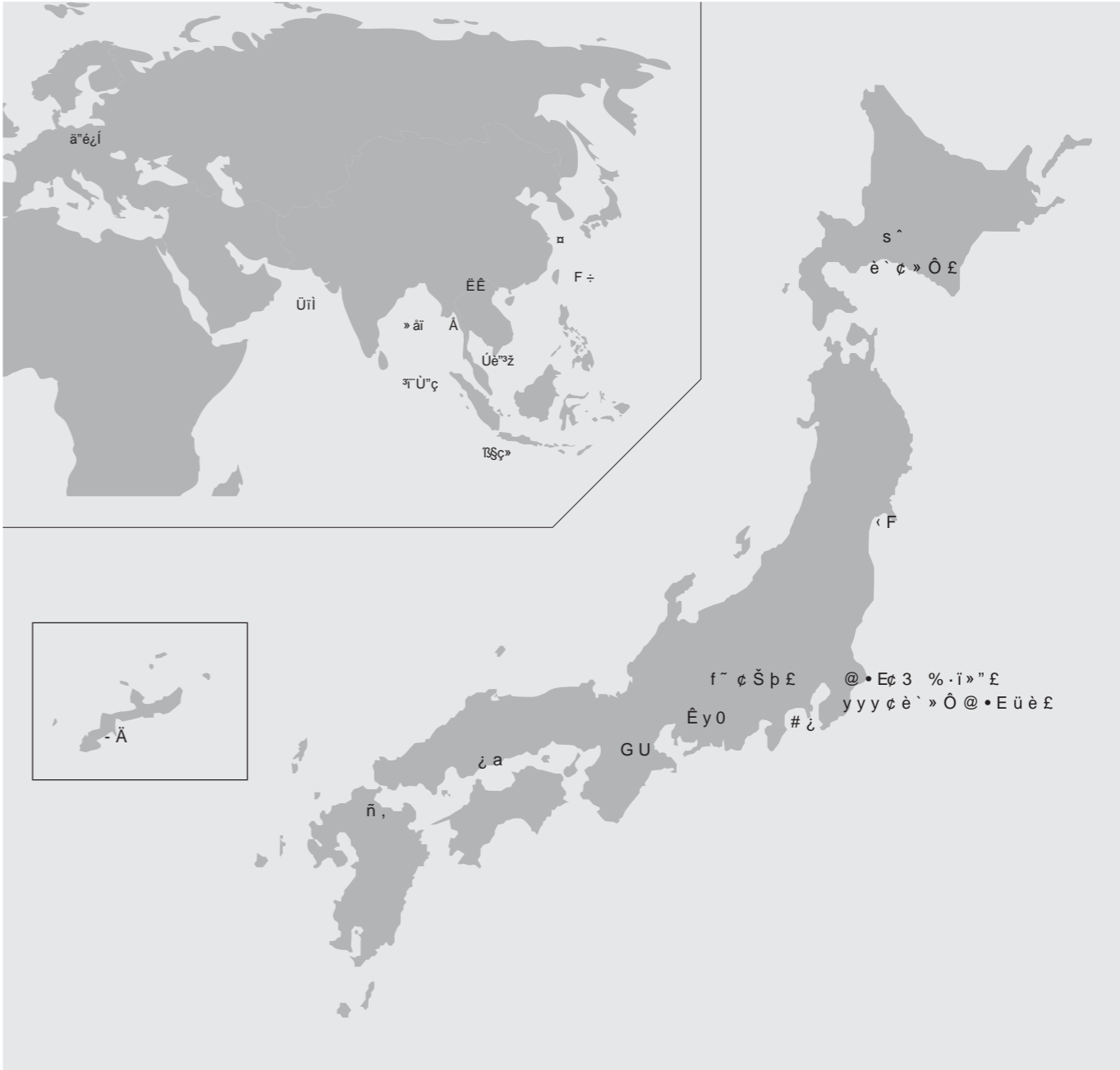
G%~Üšçπí'Çžæī~ ç Ö£	ß 5&-	GUİGUçzà¼¿É çG%~İ"«± Äİç£ y'"9
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~ »ÄÖÜqþ	ß 5&£	,']Zç'Zà-aÉ y'"9 ç £
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Óä Üµ ç Ö£	ß 5&£	•]vİçÄäF y'"9 ç £
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ä'ç¥"»±"İµ ç Ö£	ß 5&£	,']ð2 ä'Év• çä'Ü+Öº£
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CEÄç¥"»" ÆÆ" ç Ö£	ß 5&£	jCE]Éy0¼¼ àÉúÆ çDa;•ÖÜqþÉy0š3º£
		Da;•ÖÜqþ + ¥ÄÄŠæ 111ÄÄ* è 5&£ y'"9 ç £
		Da;•ÖÜqþ + ¥ÄÄŠæ 111ÄÄ* è 5&£ y'"9 ç £



本間 友基

y• -F é~é/Esrz f' ~> "èX ¥xk^ y'õMXz fU wýæ"¼"x @ á

9è@L~µ Z",é~ ~> [† 'h{ fUpx 7'wU[;¡lo^ÄwC2q ¥-¶t/) `z

þqtéYb"lqi ~gæq `z U[~±"İµp•• ¥;þ"þqtéYb"lqi ~H tý `

†'h{ 2> Z'Da;•~ç"ÓU[w m mU•• ¥-¶éY•qmsUloMX qMOCE" q

-É>³t ÖçhÈs" 2>è!o\$Á" †• O{

54,UC /O
 CæÖ á D Ö
 ðMü~dCE•HJIP!UTL H DP KQ
 CæDa;•ÖÜqþ UC\$B•»q
 İ y Ü•#™ ¼%
 \$ B • » Ö#™ ¼%
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